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AMERICAN MACHINIST

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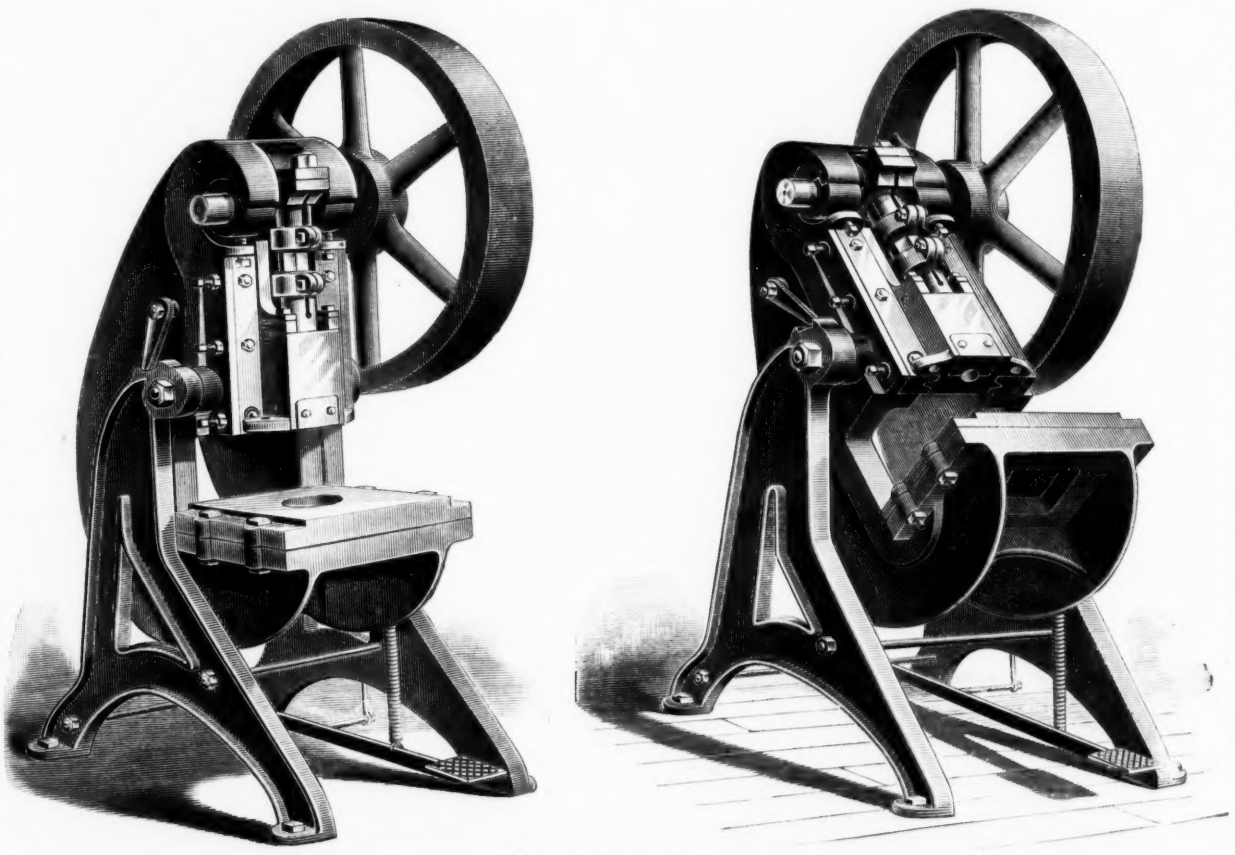
Open-back Adjustable Power Press.

The accompanying illustrations represent a new open-back adjustable press designed for cutting, forming and stamping all kinds of sheet metal work. These presses are neat and compact in form, and give evidence of experience of the designer in this class of work. The construction of the frames is such that all the stresses in the metal occur in straight lines, thereby obtaining a strong press with a minimum amount of metal. The caps of the main bearings are placed directly beneath the crank-shaft in the line of stresses; with this arrangement adjustments to take up wear in the journals are readily made, and it also provides means for taking out the crank-shaft when necessary, by simply removing two caps. The press is hung from its center of gravity, so that it can be easily set in an upright or inclined position, as shown in the illustrations. This is accomplished by simply loosening and tightening one nut, shown at the left of the machine directly beneath the pawl; and this adjustment of position interferes in no wise with the treadle mechanism.



OPEN-BACK ADJUSTABLE POWER PRESS.

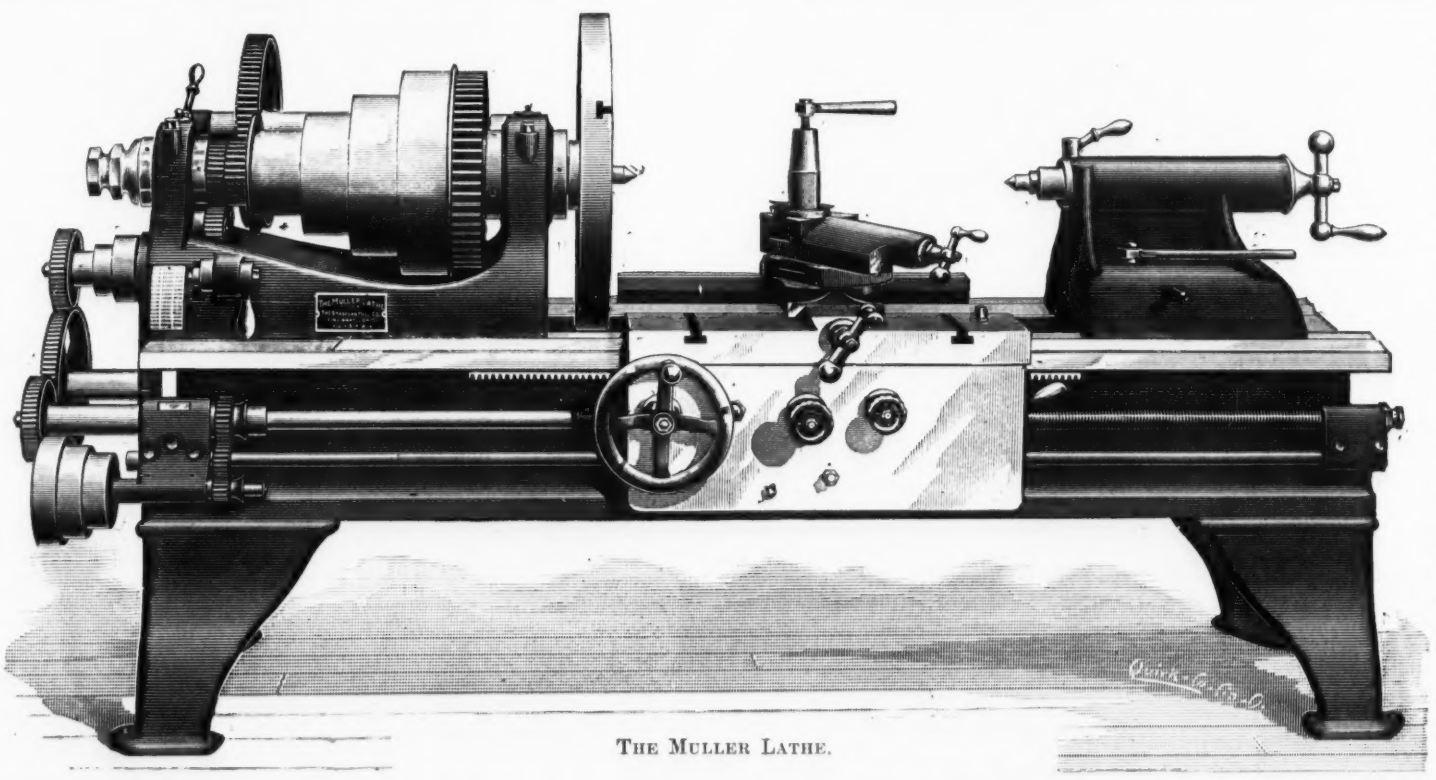
The clutch mechanism possesses some new and valuable features; it acts very quickly, locks both ways, and does not click when the press is running idle. Its construction is simple, with very few parts, and those which are subjected to a destructive wear can be readily and cheaply replaced.

Patents are pending for these presses, which are made in six sizes, varying from 300 to 6,000 pounds. each. The best of material is used, the parts are carefully fitted together, so as to make them strong and durable. They are manufactured at the Adriance Machine Works, Plymouth and Jay streets, Brooklyn, N. Y.

The "Muller" Lathe.

We give on this page a general perspective view, and on the succeeding page some details of the "Muller" engine lathe in its latest form as now built by the Bradford Mill Company, of Cincinnati, O. The shops of the Bradford Mill Company, in which these lathes are built, are among those mentioned some months ago in these columns as having arrived at a high degree of what may be called shop efficiency, by being confined strictly to one thing, that being in this case engine lathes of one type, which type is represented by our engravings.

In design the lathe does not depart radically from usual practice, but is simply made with a broad and deep bed, long headstock, carriage and foot-stock, and in all its parts designed to do the heaviest work, and yet be convenient to handle. The carriage has a bearing the full length on the bed, and is gibbed to the outside front and back, has automatic cross-feed, compound rest, and, if desired, a taper attachment, and the feed is so arranged that any desired rate can be obtained for either the screw or the rod feed, and either can be driven either by the belt or by the gears. The arrangement for this will be readily understood from an inspection of the engraving, Fig. 3, page 2, where the gear wheel *A* on the feed rod is fixed, gears *B* and *C* being slipped along on the lead screw or feed cone shaft respectively. With the gears in the position shown the feed rod will be driven by the belt through the medium of gears *C* and *A*. If now gears *C* and *A* are left in their present positions and gear *B* slipped to the left, the lead screw would be also driven by the belt, while if the change gears be in place and connected to the end of the screw while gear *C* is slipped to the right, the feed rod will be driven by the change gears. This arrangement makes it possible to cut scrolls of any desired pitch by means of the cross-feed motion, which, of course, can be made any desired rate by means of the change gears, the ratio of feed rod to cross-screw being 3 to 1.



THE MULLER LATHE.

Fig. 4 shows the arrangement of the carriage mechanism, where it will be noticed that worm gearing is dispensed with, that the friction disk is comparatively large in diameter, and that the cross-feed is not driven through the medium of the friction, but positively, as is of course necessary in cutting scrolls or spirals.

At Fig. 2 is given a section of the head of the 24″ lathe, showing clearly the arrangement and proportion of the parts. The boxes used are of bronze, are fitted to taper seats in the solid head, and are drawn in by threaded rings to take up for wear; a box, which is practically solid when in use, permits of fine adjustment, and when needing renewal can be replaced so as to restore the original alignment by simply doing a good job of lathe

work. The box girt shown in section in this view is duplicated every 24″ throughout the length of the bed.

The friction countershaft is shown by Fig. 5, and consists simply of a ring which is cast to the side of the pulley arms, turned true and smooth, to which is fitted a split ring, which, when released, opens and frees the clutch, while it is closed by means of two levers seen, which act upon projecting lugs by means of the points of the set-screws seen at the right, these screws serving to adjust the clutch and take up wear. It will be noted that the clutch is simple, and that the rings being of large diameter, the moment of friction is large for a given pressure.

Cone pulleys are large in diameter for a wide belt, the steps of these and the back gears being proportioned to give a regular gradation of speed from the slowest to the fastest.

The foot-stock spindle has a long bearing

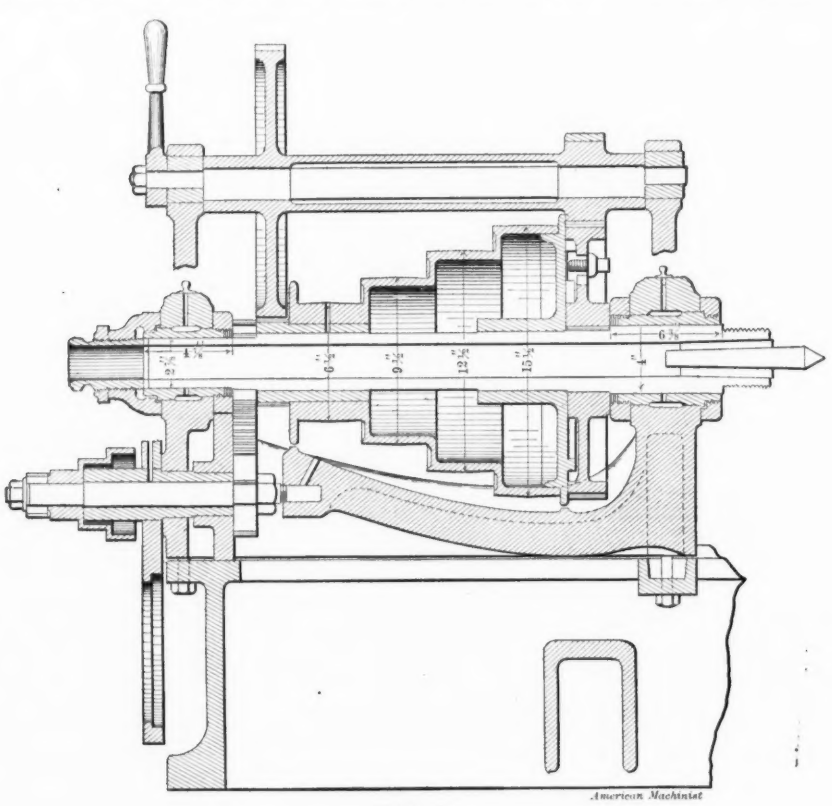


Fig. 2.

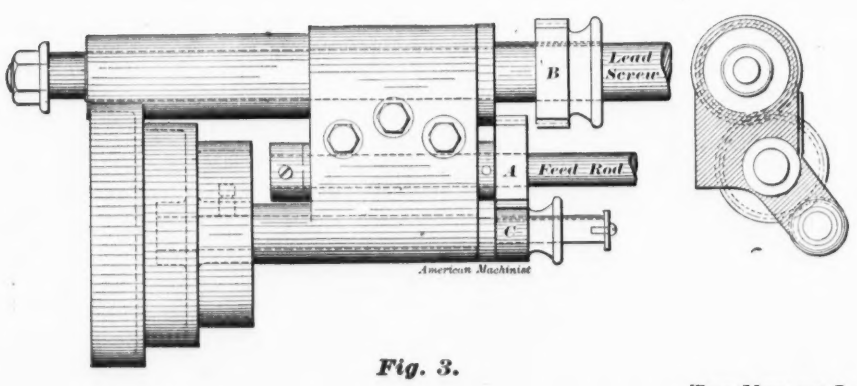
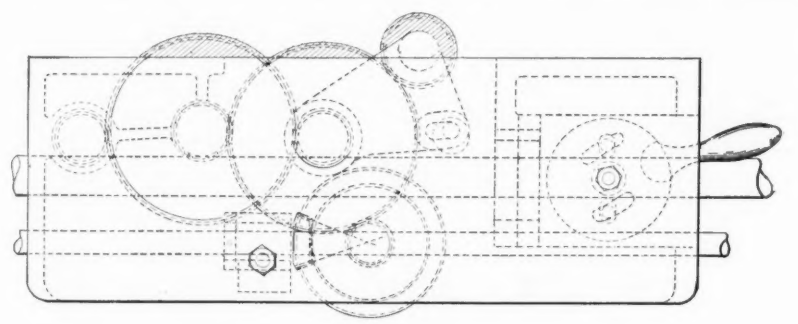


Fig. 3.



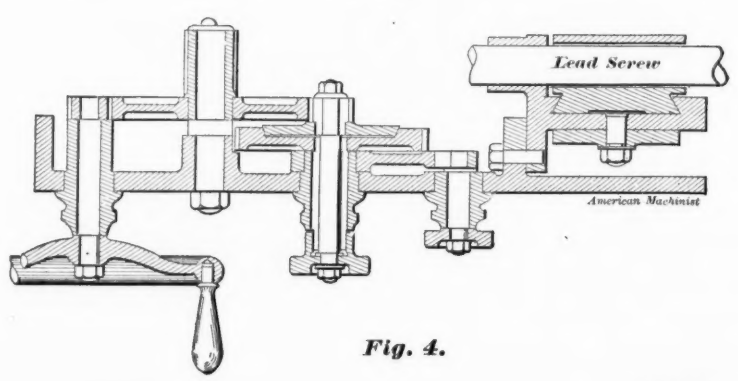


Fig. 4.

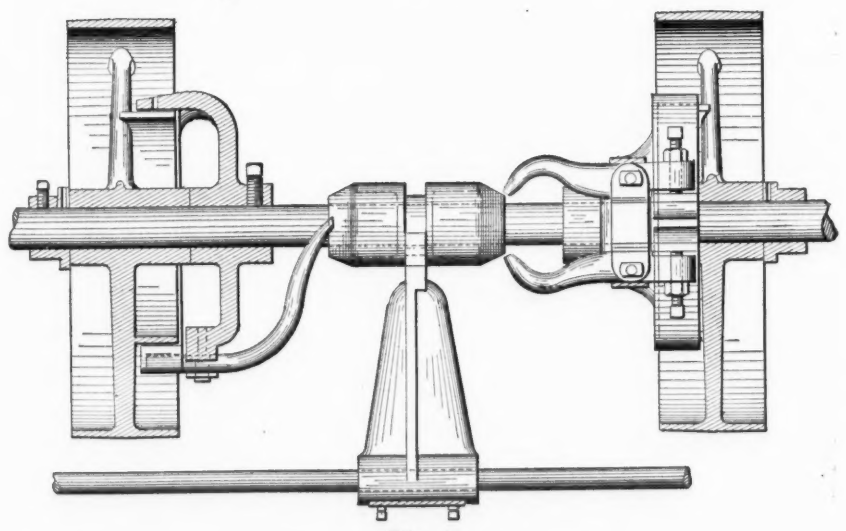


Fig. 5.

THE MULLER LATHE.—SEE PAGE 1.

and traverse, and the block is secured to the bed by two bolts which are placed well forward, where the greatest lifting stress comes. Spindles, small gears and screws are of steel. The sizes built are 17″, 20″, 24″, 27″, 30″ and 32″, with any length bed desired.

Economy in Melting Iron.

BY PROF. JOSEPH TORREY.

I have no intention of undertaking to instruct foundrymen in the art of melting iron—that may be as well stated first as last; but I do wish to point out some interesting little pieces of history and open some old sores that have not been disturbed for some time. For a text, and by way of introduction, I wish to call attention to a letter which appeared in the AMERICAN MACHINIST for May 17, 1884, by Mr. M. J. Wheatley, an English foundryman. His letter contained an account of the practice in his foundry with respect to coke consumption in melting iron, and a calculation of the theoretical quantity of coke needed for a given amount of iron. It appeared that while the theoretical amount would be closely 101 lbs. coke per ton of iron, Mr. Wheatley was using—inclusive of bed coke, of course—about 147 lbs. (or 131 lbs., as my figures make it), making 31 lbs. coke per ton of iron above the theoretical. Some of this may be accounted for, as Mr. Wheatley suggests, by remembering that the slag formed from oxide of iron, ash of coke, and the limestone used as a flux has to be melted also, and of course heat is lost by the escape of waste gases. Altogether the approximation to theory is as close as one's nerves can stand. In order to save looking up the article in question I will give some of the conditions of the melting, which speedily explain, *in part*, the very good results attained.

The quantity of iron melted was 20 tons in a 42″ cupola, with eight tuyeres 6″ square, supplied with blast from a pressure blower at 75 lbs. (probably 7.5 lbs. is meant) per square inch. 1,300 lbs. coke are used in the bed, and the remainder is added in charges with the iron, there being fifteen charges of 2,600 lbs. iron and 125 lbs. coke each. Of the 1,300 lbs. used in the bed 600 lbs. are recovered. If 125 lbs. coke are added for each 2,600 lbs. iron, then 40,000 lbs. iron will require 1,923 lbs. coke. Add to this the 700 lbs. burnt in the bed and we have 2,623 lbs. coke burned in melting 40,000 lbs. iron. I cannot make my figures agree with Mr. Wheatley's at this point. He says this gives 147 lbs. coke per ton of iron. I make it 131.

American foundrymen are more accustomed to simply giving the ratio between iron and fuel in pounds. In this case the ratio is one to fifteen, closely. The theoretical would be, according to Mr. Wheatley's calculation, in round numbers one to twenty.

In the AMERICAN MACHINIST for July 12, 1884, appeared a note taken from *Iron* giving another good record. In this case the cupola was 48″ diameter. No data given as to number or size of tuyeres. The blast pressure was about 1.5 lbs. per square inch. The quantity of iron melted was 17,920 lbs. The coke amounted to 1,232 lbs., of which 336 were in the bed. This gives a ratio of one to fourteen and a half. The blast pressure was less in this case—that is, if Mr. Wheatley meant 7.5 lbs.; he may have meant 0.75. The quantity of iron was smaller and the cupola larger. It is rather hard to make a comparison, but I should call the second the better record.

Now, some reasons for such good performance are evident on superficial examination. It is well known that large cupolas handling heavy melts are as a rule more economical of fuel. One reason for this is probably that the body of coal or the heating power of the cupola increases as the square of the diameter, while the surface through which heat can be conducted away or which can absorb heat increases mainly as the diameter. For example, if the diameter of a cupola be multiplied by 3, the interior surface will be increased 3 times, but the capacity will be increased 9 times. Another reason may be that in a large cupola the blast is better distributed and more efficient. Moreover, large melts allow nicer proportioning of fuel and flux. The slag can be better handled and the elements of waste become small compared with the total quantity of material handled. All these and more circumstances tend toward advantageous melting, but it may be doubted whether any other causes operate as powerfully as the first and second named—the distribution of blast and the decreased ratio of surface to volume.

But even in large cupolas I am inclined to think fuel ratios of 1 to 14 and 1 to 15 are decidedly rare in ordinary good practice. Mr. Wheatley seemed to think English practice was superior to American in respect to economy, and so far as my knowledge goes I should say it was, if that is a fair sample of work as done in regular English foundry routine. If this is the case, it might be worth while to look for the cause. This is the foundrymen's affair, however. About six years ago I gave an account in the AMERICAN MACHINIST of an experimental foundry plant erected for the purpose of study in connection with melting and casting. Lack of time prevented much being done, but some things were studied and some interesting points developed. One of the earliest and most interesting was the relation of blast pressure to rapidity of melting and quality of iron. Blast was supplied by a No. 2 Sturtevant fan blower driven by a 2 H. P. Shipman oil engine. The position of engineer was like a political office—in demand and subject to change without notice—and from one cause or another steam pressure would sometimes fall considerably and the speed of the blower correspondingly diminish. On the first of these occasions it was thought that the heat would be a total failure. A "divil" similar to the one popularly supposed to reside in all inanimate objects had apparently taken up his abode in the right-hand atomizer, and steam could barely be held to 60 lbs., while 130 were needed to keep up speed. To the surprise of every one, however, including an experienced foundryman, the iron came down in short order and melted hot and clear. After this the same thing was noticed on several occasions. Then again there were times when the engine would apparently be temporarily dispossessed of its arrow-tailed lodger and steam would mount up to 150 or 160 lbs., making the blower hum a lively tune. On such occasions the iron was not as good, and the melting was notably slower than with the lower pressure. In short, it was clearly shown that in that cupola, at least, there was decidedly such a thing as too much blast pressure. On reflection it seemed reasonable to suppose that such

would be the case. It seemed as if there might easily be a point where the quantity of air driven in was sufficient to produce perceptible loss of heat. The demand on the heating power of the fire might be greater than it was capable of. Then again as the blast pressure increases, especially if the tuyeres are few in number, the distribution of wind is impaired and the melting point, or zone, rather, in the cupola is raised, thus giving a cooler hearth and calling for a deeper bed of fuel to start with. But notwithstanding the thing looked reasonable, I was aware of the high pressures carried in foundry cupolas generally—that is, high for fan blower pressure—and I knew that it was a general opinion among foundrymen that without a pretty good pressure the slag would prove unmanageable, and that the iron would melt slowly and be too cold for any but rather coarse work. Under the circumstances it was certainly desirable that a trial should be made under as nearly ordinary conditions as possible in a cupola of fairly good dimensions. At this juncture it was my good fortune to make the acquaintance of a skillful and experienced young foundryman, with whom I talked over the matter and expressed a belief that, other things being equal, lower blast pressure than the average would result in better fuel economy, with no detriment to the quality of iron. He very kindly consented to give the matter a trial, and his results were in some degree confirmatory of the predictions. I have now at hand only rather fragmentary remnants of the extensive and valuable notes he sent me of his trials, which extended through the greater part of April and May, 1888. He can supplement this, if he is willing to do so, with facts and circumstances to which I have not access; but I will give what results are at hand now.

Two cupolas were tried. The first, tried during April, 1888, was a 30″. I have no data as to the size and number of tuyeres; these elements, together with the size of blower, will perhaps be filled in by my friend, should this paper chance to catch his eye. The second cupola was a 33″ one. For the first twelve days of April the 30″ cupola was run with blower at about 2,300 revolutions if I remember rightly. For these twelve days the amount of iron melted averaged 5,500 lbs. The coke averaged 760 lbs. This gives a ratio of fuel to iron of 1 to 7 closely. This is rather below the average, I think. For cupolas of that size about 1 to 8 would be nearer. On the 13th the blast pressure was reduced. The exact rate of reduction I have not, but the ultimate reduction brought it down to about 1,800 revolutions per minute. For the remainder of the month the heats were as follows:

DATE.	FUEL.	IRON.	RATIO.
April 13	700	5500	1 : 7
" 14	700	5800	1 : 8
" 15	—	—	—
" 16	600	5500	1 : 9
" 17	700	6300	1 : 9
" 18	700	7000	1 : 10
" 19	500	4800	1 : 9
" 20	700	7000	1 : 10
" 21	700	7000	1 : 10
" 22	—	—	—
" 23	600	6000	1 : 10
" 24	700	7300	1 : 10
" 25	700	7300	1 : 10
" 26	700	7000	1 : 10
" 27	650	5000	1 : 7
" 28	700	8000	1 : 11
" 29	—	—	—
" 30	650	6500	1 : 10

The average ratio is 1 : 9. Of the fifteen heats eight showed a ratio of 1 : 10, and on the 28th the high-water mark—1 : 11—was reached. During May four more heats were taken off in this cupola, as follows:

FUEL.	IRON.	RATIO.
700	7000	1 : 10
750	7500	1 : 10
650	5500	1 : 8
600	5000	1 : 8

At this point the 33″ cupola was tried. The blast pressure for each heat is lacking, but it was steadily reduced throughout the whole series. Twelve heats gave the results shown in table in second column.

The average ratio of fuel to iron is 1 : 8.5. It will be noticed that the effect is less noticeable than in the case of the 30″ furnace. The iron was clean and hot, was used for light machine castings, and no work was lost through cold iron. No trouble was experienced with slag, even when melting 1 to 11.

FUEL.	IRON.	RATIO.
650	5500	1 : 8
650	5500	1 : 8
900	8000	1 : 8 +
550	4800	1 : 8 +
600	5300	1 : 8 +
900	6500	1 : 7
600	5500	1 : 9
600	5300	1 : 8 +
600	5000	1 : 8
650	6200	1 : 9 +
750	7000	1 : 9
750	6800	1 : 9

Note.—The heats marked + gave a ratio nearer 1 : 9 than 1 : 8.

It must not be supposed that this subject is here presented as something entirely new. I have no doubt the isolated facts are well known to many, perhaps all foundrymen; but if the above *combination* of facts, particularly as exemplified in the performance of the 30″ cupola, were known and believed, there would be better fuel economy than there is now. Perhaps I am away behind the times, and there are dozens of foundrymen melting as high as 1 : 10 in 30″ cupolas every day, but I hardly think it is the case. At all events, if such work is being done, I for one should like to know it.

Iron Paper.

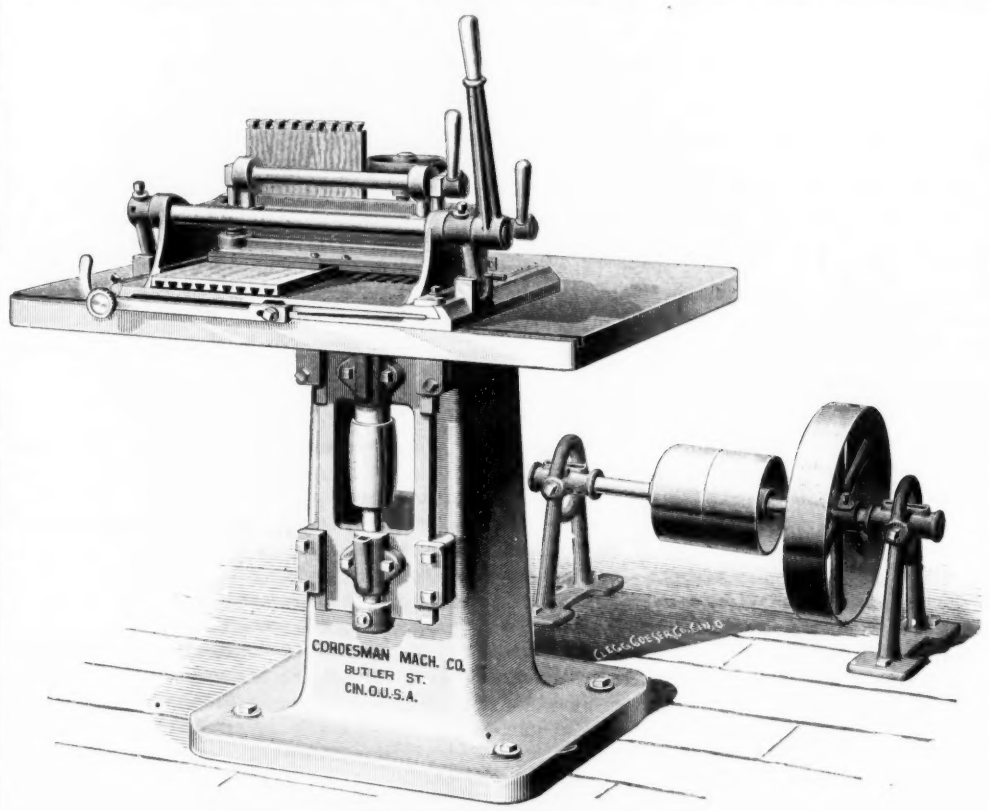
It will not perhaps be remembered that in the great exhibition of 1851 a specimen of iron paper was exhibited. Immediately a lively competition ensued among ironmasters as to the thinness to which cold iron could be rolled. One iron maker rolled sheets the average thickness of which was the $\frac{1}{1800}$ part of an inch. In other words, 1,800 sheets of this iron, piled one upon the other, would only measure one inch in thickness. The wonderful fineness of this work may be more readily understood when it is remembered that 1 200 sheets of thinnest tissue paper measure a fraction over an inch. These wonderful iron sheets were perfectly smooth and easy to write upon.—*Paper Maker.*

Dovetailing Machine—Cabinet Surfacer.

We illustrate on this page a dovetailing machine in which the special points aimed at are simplicity and compactness, ease and convenience of operation, ability to do the best grade of work, and a wide range of capacity.

The machine stands upon a substantial column at the front of which the vertical spindle is placed, the cutter being held in a chuck at the upper extremity of this spindle. Vertical adjustment of the spindle is made by means of the hand-wheel seen on top of the machine at the rear.

In operation, two pieces—one side and the front of a drawer for instance—are clamped in place by eccentric shafts moved by levers. By a forward movement of the upright lever the cutter then passes through, and when the lever is drawn back, the work is at the same time automatically moved along for the next cut. This is continued until the work is completed, when the machine is reversed by the draw bar shown in front, and the same operation repeated The work done is very accurate, the pieces fitting together closely, and in a manner suitable for the highest grade of work. The work done is that known as the lap pattern. The table is of iron, spindle of steel, with ground bearings. The machine is made in three sizes, to dovetail stock 13, 15 and 17 inches wide, the smaller machine being usually furnished in combination with a shaper, from which it can be removed by simply lifting it from the table. The larger machines can also be made to lift from the table when desired, the spindle being then available for use in friezing, it being fitted with a friction reverse for this purpose instead of the ordinary countershaft. The machines are made by the Cordesman Machine Co., Butler street, Cincinnati, O.



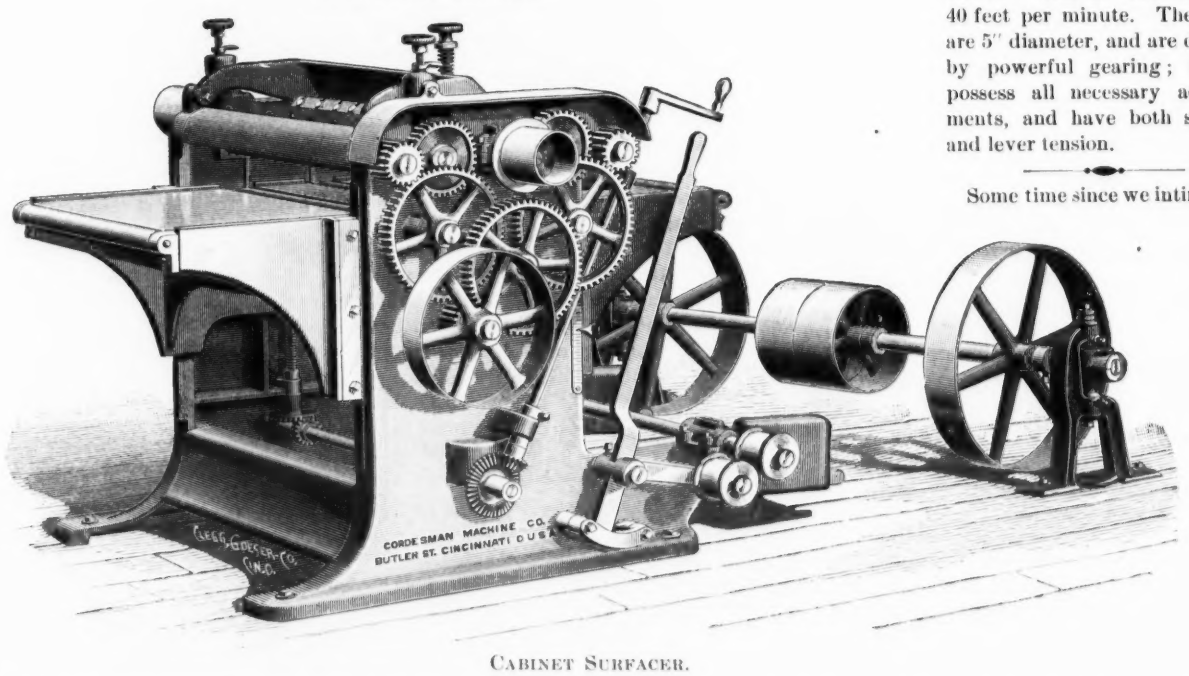
DOVETAILING MACHINE.

A double-belted cabinet surfacer or planer made by the same company is shown by the second engraving, the capacity of this machine being to plane up to 30 inches wide and 9 inches high. The frame of the machine is strongly made, with ample bearings on the floor, to prevent vibrations. The bed, which is also made heavy, is attached to the frame at four points with adjustable dovetailed gibs permitting the heaviest cuts to be taken without jar or vibration, while the height of the bed is readily adjusted by a crank having an index which shows directly the thickness of work being planed.

The cylinder is of steel with journals ground true, and has special provision to prevent tearing of wood which is cross-grained. It is driven by a belt at each side.

There are feed rolls both above and below the bed, and there are pressure bars at each side of the cylinder, so arranged as to come very close to the cut, and which automatically adjust themselves to inequalities of the lumber being planed.

The feed is driven direct from the cylinder, and there are two rates of feed—30 and 40 feet per minute. The rolls are 5″ diameter, and are driven by powerful gearing; they possess all necessary adjustments, and have both spring and lever tension.



CABINET SURFACER.

Some time since we intimated that a failure of the Legislature of Tennessee to repeal the law that permitted the employment of convict labor in competition with free labor in the mines of that State would lead to further trouble. As we predicted, the miners, turning out in force, have released a large number of convict miners, meeting with little or no opposition from the guards. The law is obnoxious to the people in certain localities of the State, and its enforcement is a question of serious doubt, as the soldiers to be employed for that purpose are very likely to be in sympathy with the miners. We believe the law that permits the leasing out the convicts to work in mines for individuals or companies is a bad law, but its repeal should be sought by legitimate means rather than its nullification by force of arms.

Twelfth Annual Meeting American Society of Mechanical Engineers.

The opening meeting of the Twelfth Annual Convention of the A. S. M. E. was held at Sherry's new assembly rooms on Fifth avenue, Monday evening, 16th inst. This was chiefly social in its character, and took the form of a reception to visiting members and invited guests, many ladies being present.

President Robert W. Hunt, of Chicago, delivered a very interesting address, which was devoted mainly to a review of the history of the development of rolling-mill practice in this country, with which he himself has been intimately connected. He first referred to the recent great prosperity of the society and the unprecedented attendance at the Providence meeting, closing this part of his address by announcing that Providence, not stopping at extending a liberal hospitality to the society, had presented to it a very considerable sum which was left as surplus in the hands of the local committee after expenses of entertainment had been paid. This had been invested in books for the library, and thus, in the words of the president, "while the 'good things' of their hospitality can be with us but as memories, we will ever have in books the living thoughts of great minds to mark the interest felt in our society by our Providence members."

The present membership was given as 13 life members, 1,190 members, 56 associates and 166 juniors, or a total membership of 1,443.

After referring further to the record of the society during the year, to its standing, to the confidence reposed in it, and to its prospects for the future, Mr. Hunt passed on to the main topic of his address, which was treated in a very interesting manner and which we regret not being able to give in full, for lack of space. We give, however, a few of the most interesting points brought out.

The first rails (for railroads) other than those of the strap pattern, were produced at the Mount Savage Works, in Maryland, which were erected in 1843. The rails produced were of the U pattern, and in 1844 the Franklin Institute awarded in their honor a silver medal. The first T rails produced in this country were made at the Montour Works at Danville, Pa., in October, 1845. While individual plants have disappeared and been forgotten, the industry has gone on, and today America leads the world in rail production. Up to July, 1857, all rails were rolled on non-reversing 2-high trains of rolls, it being necessary with these to pass the metal which was being rolled back over the upper roll after each pass, thereby losing not only an amount of time equal to that consumed by the actual rolling, but losing also a goodly portion of the heat from the metal. These and other difficulties were remedied in 1857 by the invention of Mr. John Fritz, a member of the society, who was the Chief Engineer of the Cambria Iron Company. He devised and constructed the first 3-high roll train in which the metal was passed above and below the central roll alternately back and forth, so that practically no time nor any heat was lost. This invention seems now to be simple enough, but it must be considered in the light of the fact that at that time rolling mills were looked upon as old institutions, and in fact Mr. Fritz met with every possible discouragement from other engineers, who were sure his attempt would fail. In fact, "some of those high in the councils of the Cambria Company entered solemn and official protests against that crazy man Fritz being permitted to waste the company's money. Its affairs were badly enough off as it was, without adding this foolishness." In spite of all this the mill was built; and here Mr. Hunt quoted the words of Mr. Fritz himself. "The 3 high mill was started on Wednesday, July 29th, 1857. We charged and heated six rail piles. We rolled three of them, making perfect rails, when the eccentric of the rail-mill engine became hot and bent the rod badly. Having tried the mill, and all gone perfectly, we stopped; resuming work on Friday morning and continuing regularly until the usual quitting time on Saturday afternoon. Mr. Alexander Hamilton, then and now the superintendent of the mill, and I, left the works about half-past five in the evening, congratulating ourselves that our troubles, so far as the rail-mill was concerned, were practically ended. About seven o'clock that night I heard the mill whistle blow for fire, and at once started for the works, to find the mill in flames from one end to the other. In less than an hour's time the whole structure was consumed. I will leave you to imagine how I felt while seeing, in one short hour, our best efforts and the labor of a whole year destroyed. But we went at it again, and in about a month's time were again making rails.

"As almost every person who was supposed to know anything about rolling mills had predicted a failure, the story got out that we had tried the mill, and finding it a failure, had burned the whole thing down, to hide the blunder."

Said Mr. Hunt, "I doubt if ever, during Mr. Fritz's subsequent eventful life, he has had to carry quite as heavy a mental load. Since then mighty works have grown from his designs, and under his charge. Millions of capital have been invested on his judgment. The monster steam hammer of the world is his creation; but I venture that, while waiting for the shock of its first 125-ton hammer blow, his anxiety was but as that of a child compared to that felt while the first rail pile was passing between the rolls of his 1857 mill." The Fritz mill was rapidly adopted by the rail-mills of the country.

The first commercial rolling of steel rails was at the Cambria Works, in August, 1867, on an order from the Pennsylvania Railroad, and from steel made by the Pennsylvania Steel Company, at Steelton. At first the steel ingots were drawn into blooms under steam hammers, but Mr. Fritz, concluding this was not the best way of treating the material, had blooming rolls prepared, and though again encountering opposition and discouragements, was successful, and was the first to do the work in this manner, being, however, sustained and assisted by Mr. A. S. Holley, who at that time was superintendent of the Pennsylvania Steel Co.'s Works.

In 1868 the Freedom Iron and Steel Company started works near Lewiston, Pa., with a plant of machinery almost entirely imported from England. They put in a reversing plate-mill driven by a reversing Ramsbottom engine. This was soon changed to a rail-mill, and became the first reversing rail-mill in America.

In the early days of rail-making the only means of cold-straightening the product was by the blows of a heavy sledge, and it was not until about 1856 or 1857 that a straightening press was employed. The sledge process was, of course, slow, and would not be applicable to the heavy rails now. The hot bed was next improved, after which, in 1875, A. J. Gustin, then superintendent of the St. Albans (Vt.) Rail-mill, invented a rail-curving machine, which, together with power appliances for dragging the curved rails down the hot bed, were patented, and used by many mills. Holley used to say, in that spirit of prophetic jest so constant with him, that "the day would come when we would start a rail-mill on Monday morning, and then go home, after locking the doors, only returning each morning to count the rails that had been made during the preceding twenty-four hours, no other manual labor being necessary."

In March, 1884, the speaker introduced driven tables in front of the finishing rolls of the rail train of the Albany and Rensselaer Iron and Steel Company, at Troy, N.Y., and in connection with Mr. Max M. Suppes, then master mechanic of that department, the principle was extended, and is now widely employed. In this connection a high tribute was paid to the memory of Capt. Wm. R. Jones, who at that time was general superintendent of the Edgar Thomson Works. He advised his firm to secure authority to use the patents of Mr. Hunt, but for the roughing rolls used a different arrangement.

The three men then joined interests in further patents, and, speaking of him, Mr. Hunt said: "As an instance among many of his great heart, he wanted to give me the whole thing saying, 'You were the first to put this matter in a practical shape, and deserve it. I have only gone further with your ideas.'" Referring to Capt. Jones' death while in the performance of his duty, he showed how thoroughly devoted to that duty the man was, and said: "Please excuse my digression while paying this poor tribute to Captain Jones' memory. It deserves more than I have said. Such men have made, have saved, and will continue to be—our nation."

An inventor of note was Mr. Bernard Lauth, who in 1859 devised the system of cold-rolling iron, so extensively used before the general introduction of mild steel. In 1864 he invented the three-high plate mill with the middle roll much smaller than the other two, which soon became the standard American mill, and has been largely adopted in other countries. Other improvements of great originality and value have been devised by him, and his name must always rank high among those who made successful the iron and steel industries of this country.

After describing briefly the process of rolling the wheel tires from ingots cast with a cored hole large enough to admit a small roll, the speaker passed on to what he called the latest radical departure in rolling-mill practice, which, though not yet quite a commercial success, he thought had attained a position entitling it to a record. This was the process of rolling steel sheets directly from the liquid metal, by Mr. Edwin Norton, of Chicago, using machines illustrated in our issue of Aug. 15, '89. Mr. Norton had kept fully posted as to what had been and was being done, and knew that Sir Henry Bessemer had years before made some experiments in this direction which he (Norton) thought he knew the reason for the failure of. He was disposed to give Bessemer full credit for all he had done, and wished him to become interested in the process, now that it bid fair to succeed, and proposed an honorable commercial relationship. Certainly there was nothing disrespectful in this, no matter how great the man to whom it was made. Up to this time Bessemer seems to have attached little importance to his experiments of many years ago, and perhaps this "is none of my business, but Sir Henry has aroused my American ire."

In a paper recently read by him before a late meeting of the Iron and Steel Institute, on "Rolling Fluid Metal," he says, "I received, about two years ago, a parcel from America containing a small sample of sheet metal, which was being successfully manufactured there. The *person* from whom I received it informed me that it was made by a slight alteration or improvement on my patent of 1857 for rolling continuous sheets and thin bars of iron or steel direct from fluid metal. He offered me one-half of his patent if I would undertake its introduction into this country. I did not accept his offer, and there the matter rested.

"The circumstance stated has, however, afforded me an opportunity of showing you a small sample of a continuous sheet, produced direct from fluid metal at a single operation, and proves beyond doubt or question the important fact that fluid metal may be chilled and formed into a continuous sheet between rolls that are kept cold, while it well illustrates the spirit of enterprise of our American cousins, who are so prompt to recognize, to adopt, and to improve upon the inventions brought forward in Europe."

The speaker thought Bessemer might have treated Mr. Norton a little less cavalierly without any prejudice to his great fame. The greatest have always been under obligations to others for portions of their triumphs, and always will be.

"The Bessemer process was a failure for all but the higher purposes until Mushet's invention, and while Sir Henry honored himself by settling an annuity upon Mushet, who at that time had made nothing from his invention, still I for one would have had my already profound respect increased if Bessemer had even mentioned Mushet's name in his letter, giving the history of his process, which was read at the Pittsburgh meeting of the Iron and Steel Institute." He honored Bessemer highly, but was not willing that he should have all the credit for this latest [Norton's system] development in American rolling-mills.

Tuesday morning the society met at its house for a business session, and heard reports from various special and standing committees. It was announced that the opinion of the members seemed so generally in favor of accepting the invitation to hold the spring meeting in San Francisco that that city had been selected by the council as the next meeting place; that the society had initiated a movement looking toward inviting the various engineering societies of Europe to come to this country during the World's Fair at Chicago, letters having been addressed to the various societies asking for their co-operation, and that the joint committees be composed of officers of the various societies. Total receipts of the society during the year had been $19,842.64, and the outlay had been $2 less, besides which the society had a number of outstanding debts, including about $400, money advanced by Secretary Hutton to keep his office going—the total amount of bills due being about $3,000, with only $129 due the society from members.

It was stated in this connection that though the house, which is the home of the society, is called its house, it really does not belong to the society, but to the M. E. Library Association, of which the society is a tenant. This, among other advantages, allows the library to be made a public one, upon which no taxes are paid—the society's charter not allowing it to maintain a public library.

The Committee on Standards, through its chairman, James W. See, reported that a bill had been drawn up and presented to congress. It had been referred to the Committee on Patents, of which Mr. Butterworth was chairman, and he had promised to report favorably upon it, but had not reported at all. So far it had been a repetition of the society's previous experience with desirable bills in which there was no politics. It was very difficult to secure action.

The Committee on Standard Tests reported progress, and recommended that its secretary, Mr. Gus C. Henning, who is a working member of the committee, be sent to Vienna to take part in a congress of engineers to meet there to consider the question of uniform tests throughout the world. The importance of being represented there was set forth by Messrs. Towne and Henning, the latter offering to give his time for the purpose if his expenses were paid. The council were authorized to take such action as seemed to them advisable in the matter. Committee on Standard Pipe Flanges was continued, as was that on Standard Units, neither of these having as yet done anything calling for a report.

The question of amending the constitution then came up, and before proceeding to a vote two piles of postal cards were exhibited, which had been received from members expressing their opinions on the question of raising initiation fees and dues. The affirmative replies outnumbered the unfavorable ones very largely—probably about 8 to 1—and with very little discussion the propositions to increase the initiation fees and dues were carried by unanimous votes.

Strangely enough, the only proposition that called forth any discussion was upon raising the fee for life membership, some of the members having conceived the idea that it would not be fair to ask $200 for what those already life members had paid only $150 for. The discussion soon showed the absurdity of this position, and this amendment was also carried unanimously.

The proposition to require the Nominating Committee to place the names of two candidates in nomination for each office, instead of one, was reported upon adversely from the council, and the discussion brought out the

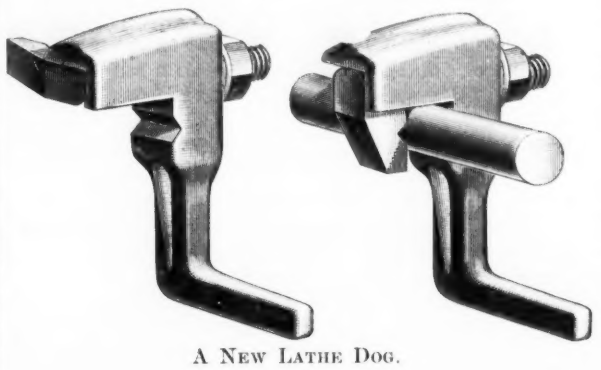
fact that such a change would probably not prove popular, it being feared that it would lead to more or less discreditable and undignified wire-pulling and log-rolling, and could do no good not already possible under the present plan, which allows any five members to become a nominating committee if they chose, and to put candidates in nomination whose names shall be printed upon the ballots without anything to distinguish them from the candidates of the regular committee. As one member said, the present plan was the Australian system of voting carried to perfection. The proposition was defeated, receiving only one affirmative vote.

Report of the tellers of election was then read, the officers elected being as follows: For president, Charles H. Loring, of ——; treasurer, William H. Wiley, of New York; vice presidents, Messrs. Geo. I. Alden, E. F. C. Davis and Irving M. Scott.

The afternoon was not specially assigned, and was used by the members as fancy dictated. In the evening, papers were read and discussed and some topical questions were discussed—these discussions being reserved for publication with the papers in later issues.

Wednesday was excursion day, and, in marked contrast to the preceding day, it was clear, bright and cold. Soon after 10 A. M. the sidewheel steamer Laura M. Starin left the pier at the foot of West Twenty-third street with a large crowd, among whom were many ladies, bound on a sight-seeing expedition. Proceeding down the Hudson river, around "the Battery," up under the New York and Brooklyn Bridge to the Navy Yard, the party disembarked and spent about two hours in a tour of inspection, which included the new ships of "The White Squadron," the "Atlantic" and the "Chicago," as well as the double-turreted monitor, the "Miantonomah," on which latter vessel a large force of men were at work preparing the vessel to go to sea. This, with its armored sides and turrets, with four 10 inch rifled guns, is now the strongest vessel of the U. S. Navy, but, of course, the newer and more modern vessels of the White Squadron attracted much the most attention, and were thoroughly inspected from top to bottom, and from the Paris-made search lights to the 8 inch rifled guns, the workings of which were very courteously explained by gunners or officers. The visitors were expected, and everything was, of course, in splendid order and entirely open for inspection. Although the "Chicago" is a twin screw vessel, she has beam engines which are entirely below the water-line, and the engine room is so crowded with machinery that the chief wonder is how men can stay in it when the engines are in motion, there seeming to be scarcely an inch of spare room. After admiring the splendid appointment and fittings of the new vessels, the party at 12.30 embarked and recontinued the voyage up the river to the foot of East One Hundred and Thirty-eighth street, lunch being served while on the way. The afternoon was spent in inspecting the works of the De La Vergne shops, which are certainly among the finest and best equipped in the land. The work here is on refrigerating machines—mostly of large size—the parts for a 500-ton machine in course of construction being seen on the floors. Many special machines are used, especially in doing the work upon fittings, which, on account of the high pressures carried and the troublesome character of ammonia when under pressure, must be much better made than the ordinary commercial article. The work done is of the highest grade, and it is done in excellently arranged and constructed shops, beautifully situated. We shall probably have more to say of them hereafter.

Refreshments were served here also in the dining room attached to the offices. About



A NEW LATHE DOG.

5 o'clock the boat landed at the foot of East Thirty-second street. The evening was devoted to seeing "Alabama," at Palmer's Theatre.

Thursday morning's meeting opened late, and with a cold auditorium, due to the fact, as explained by the president, that a new janitor had failed to "take time by the forelock" in the matter of starting fires.

The session opened by the presentation of Mr. Crane's paper on "The Idiosyncrasies of Chimney Draught," which led to quite a spirited tilt between some of the members who had previously presented papers on the subject of chimney draught, and some members of the publication committee—Mr. Kent attacking the author of the paper and the committee savagely, on behalf of the mathematicians, and being as vigorously attacked in return by those on the other side. The particulars regarding this may appear in connection with an abstract of the paper, which we may publish.

It was voted that, as the end of the list of professional papers had been nearly reached, their presentation should be proceeded with at that session until all were finished, and this was done, although it resulted in the time for discussion, especially of topical questions, being cut rather shorter than seemed desirable in some cases, and, in fact, most of them were not formally presented to the society.

The discussion on two of these was, however, taken part in by Mr. Chas. T. Porter, who, having so far recovered his health as to enable him to attend, was welcomed by the president upon the part of the society, and greeted with applause upon rising to speak.

The afternoon was spent in visiting various places of interest about the city, including Central Park, the American Institute Fair, and various engineering establishments, many of the members, however, spending the time in pleasant social intercourse at the society's house or at the Engineers' Club, near by, which had been practically thrown open to the visiting members, and where many of them met to take their meals and to hold informal reunions of the most pleasant character.

In the evening a reception was tendered the visiting engineers and their ladies by resident members. It was held at Lenox Lyceum, corner Madison avenue and Fifty ninth street, and the program included a promenade concert, dancing and collation, closing about 2 o'clock on the morning of the 20th.

The discussions of topical questions and other matter relating to the meeting will be published in a future issue, lack of space preventing its appearance at this time.

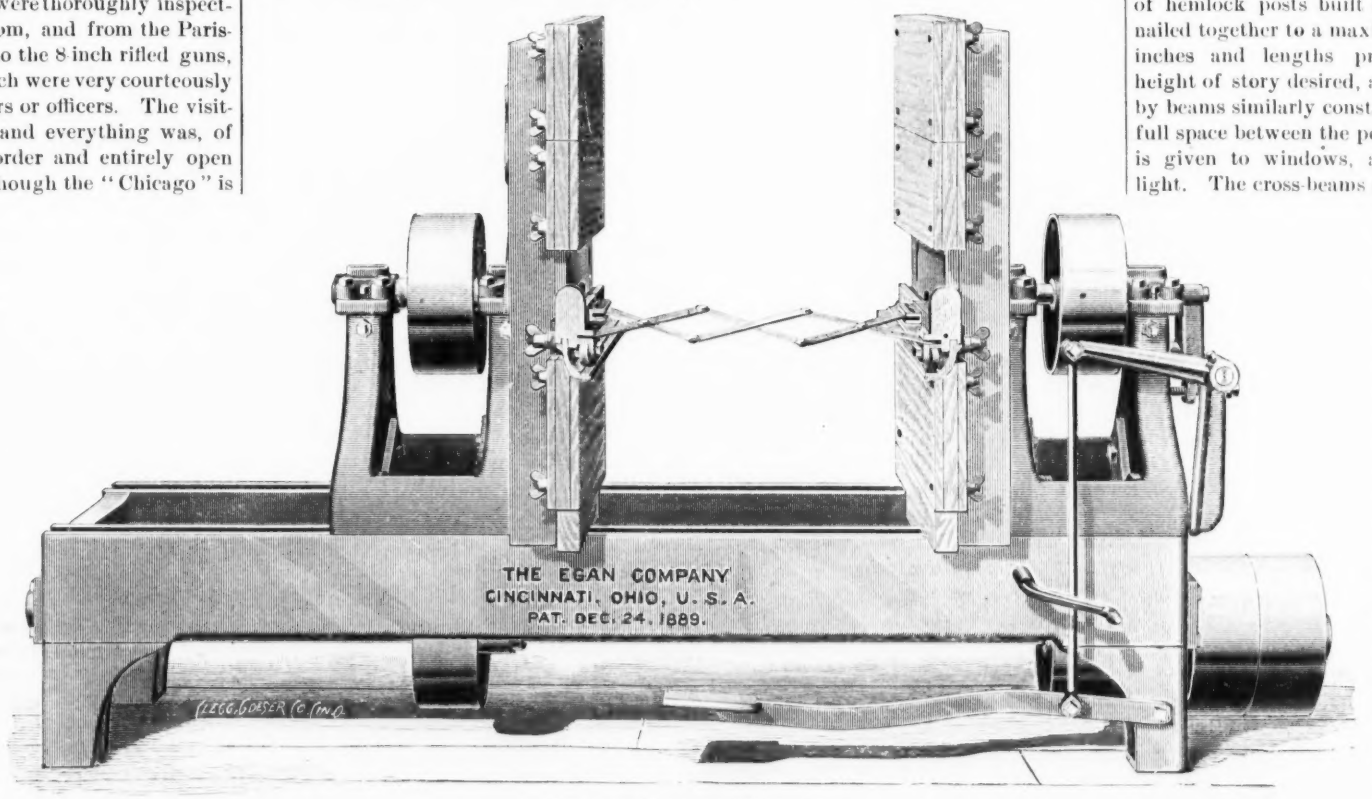
Drawer Fitting Machine.

We illustrate herewith a machine for fitting drawers in cabinet and furniture work. As will be seen, it consists of a bed upon which are mounted two heads, one of them being movable, to accommodate the machine to different sizes of work. Each head carries a spindle upon which is mounted the disk, which is made of iron. The drawer is placed between the heads and both ends operated simultaneously, the dust being removed through the frame of the machine by an exhaust fan.

The disks are incased, to avoid scattering dust as much as possible. Suitable handwheels are provided for moving the heads, and there are stops which regulate the amount of cut.

The belts which drive the spindles are run from a countershaft placed below the machine. It has been found in practice that a man with this machine will fit about five times as many drawers as by hand, and, generally speaking, they will be better fitted, especially since they can, if desired, be made uniform in size.

The machine is built by the Egan Company, Cincinnati, O.



DRAWER FITTING MACHINE.

A correspondent is desirous of knowing where the castings used in the construction of the St. Clair Tunnel were made. Probably some of our readers can give him the information he asks for.

A New Lathe Dog.

We give with this two views of a new lathe dog, which, as will be seen, differs quite essentially from the usual construction. It consists of the outer frame, which is a steel casting, and a bolt which in form resembles what is known as a gib bolt, which is tightened upon the work by the nut at the back. It will readily be seen that this dog can be placed over the work at any point after it is in the lathe, or that it can be put between collars. It also has a wide range with respect to the sizes it will hold, four of them usually including as wide range of sizes as are covered by twelve dogs of the ordinary pattern. The bolt is made of cast-steel, hardened. The dogs are made in four sizes, to take work from ¼" to 3", by N. S. Ashworth & Co., Amber and Adams streets, Philadelphia, Pa.

A New York woman was showing her aged mother, who had come in from the old Vermont homestead, all around the city last month. The old lady had seen many wonderful things when she had been here a few days, and was prepared to believe almost anything of these queer New Yorkers and their curious modes of living and amusing themselves. One of the most interesting things she met with was the coming cable railway in Broadway. She had seen that fine thoroughfare turned into one great trench, and she had been told that hereafter the cars would be pulled along by a wire rope operated by steam power. As soon as a part of Broadway was completed she was taken to see it, and, in relating afterward how it looked, she said: "And right between the tracks there is one long slot from the Battery to Central Park for the passengers to drop their nickels in before they step on the car."—*New York Tribune.*

The new four-story building erected by E. C. Stearns & Co., of Syracuse, N. Y., for manufacturing purposes, has an outside veneering of brick for the sake of exterior appearance and to comply with the fire laws. The efficient structure is inside, and consists of hemlock posts built up of 2 inch planks nailed together to a maximum size of 14x14 inches and lengths proportioned to the height of story desired, and bound together by beams similarly constructed. Nearly the full space between the posts in outside walls is given to windows, affording abundant light. The cross-beams and inside posts are similarly constructed, making the entire building firm. The whole interior has been liberally coated with whitewash—certain experiments with which, made for the purpose, having convinced Mr. Stearns that whitewashed wood was substantially fireproof. Shavings so treated were set on fire and went out without burning up.

President Yerkes recently distributed $975 in gold among prize gripmen of his cable lines. Three prizes are annually offered by the company, of $100, $75 and $50 each to gripmen with the best annual record. On examination it was found that nine gripmen had a record without an accident or a complaint, and that twelve others were entitled to either first or second prizes. The nine received $75 and the other twelve $25 each, making a total of $975 awarded, instead of the $225 promised. This is a just and generous recognition of merit, capability and efficiency in work, and the showing is a creditable one both for the company and the employes.—*The Chicago Journal.*

LETTERS FROM PRACTICAL MEN.

A Subway Threading Device—Taps—Work Benches—Inaccurate Steel Rules.

Editor American Machinist:

In one of your recent issues there was shown a device for placing wires or cables in conduits—what is termed "threading" by some engaged in the business.

While not doubting the efficacy of the device illustrated, it may not be out of place to illustrate a simple arrangement for the same or similar purpose which was exhibited at the Franklin Institute several years ago—the invention of a Mr. Isaac Norris, if I am not mistaken.

It was exceedingly simple, and yet it appeared as though it ought to work satisfactorily; whether it has been in actual practice or not, am not able to say.

It consists of a block *X* to which is connected the tongue *Y*, which extends back through another block *Z* as shown; this tongue can be made of any desired length to suit circumstances. The springs *S* shown on each side of both blocks were to prevent it being withdrawn while in operation, but they do not retard the forward motion in the least. On the back block is a pulley *A*, and on the head a similar pulley *B;* two cords which run over these constitute the working equipment of the device.

Suppose the two blocks to be close together, and to be entered into the conduit they were to thread, the operation is as follows:

The cord *C*, being fastened to the back end of the tongue and over the pulley *A*, will, upon being pulled, force the tongue and the head block ahead to the extent of its travel; now by pulling the other cord *D* the back block is again pulled up to the head as it was when starting, the springs at the side preventing the stationary block from being pulled backward.

A continuation of this operation, pulling first one cord and then the other, will advance the "threader" at a fair rate of speed; it has the advantage of being extremely simple and easily made. It can be made in almost any shape to suit different conduits of different sections, but there seems to be no reason why it should not work. Within the past year I have seen some similar device patented, but have forgotten the party's name; however, this was exhibited at the institute named at least four years ago, so it seems safe to say that it can be used by any one who has occasion to do so.

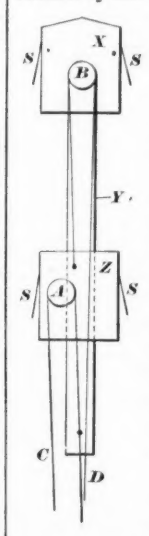
In "Mechanic's" very interesting letter, in the issue of October 1st, he says "that he does not know as any one ever tried to back off a square thread tap in the thread." A few do, but not many. I have made it a rule for several years, as it pays in the end, even if you have to file them back, but when we can do it as "Mechanic" describes there is no question about the economy of the operation.

His suggestion deserves more than a passing notice, and will be tried by many who are after the best tools with the least work. It seems as though it ought to be of value to all who have such work to do. The trouble that he speaks of in the taper tap—that of having the tap jam from the back of the thread being higher than the front or cutting edge—can be avoided by the use of the "step" tap, which is a series of straight taps on the same shank or bar, each step being a little nearer the full size of the thread. Of course many, and no doubt most of the readers of this paper are familiar with this form of tap, and probably have good reasons for not using it, but from the fact that I see very few in use, the thought comes that perhaps some of it is because all do not know of its existence.

Personally, I prefer it to the taper tap for any work for which it seems adapted, though it is a more expensive tap to make, and all work is not such that its good qualities come to light. To get the best results, the steps should be long enough to allow one step to get through the work before the next one starts, but for long work this is impossible, and in long work its only advantage over the taper tap is the fact that it has not the objection "Mechanic" refers to, of having the back of the thread higher than the front.

Of course it will work and give good results when the steps are not as long as before mentioned, they can be suited to the work in hand, and need not be over a half inch in length; but with their decreased length their advantage fades away, or ceases to be as prominent. When used as first described, with steps that go through the work before the next step enters, they are, of course, the same in effect as though they had used a number of straight taps, each cutting a portion of the thread.

Every one knows the annoyance that is caused by the benches becoming worn rough and splintering up on the upper surface; this is especially true if the work in hand is of the small variety. Many schemes have been tried for preserving the smoothness of the surface, from the solid cast-iron bench to the paper-covered bench, and they all have their field of usefulness.



The paper, or more properly the card-board bench, is easily made on any bench, by securing a few sheets of what is termed "press board" in some localities, and by fastening it over the bench a smooth surface is easily obtained; when it becomes torn or dirty it can be renewed at small expense. For a durable bench covering, get a few pieces of good sheet-iron; the Russia iron is best, or at least the finish called "Russia," though most of it is probably made in this country.

This makes a very durable covering and is easily kept clean, and is better on many accounts than the solid cast-iron bench; it has some of the elasticity of the wood—not as solid as the all iron. The solid iron bench has but few advantages for ordinary work; in fact, the wooden bench is to be preferred in nine cases out of ten; there may be special applications where it is of more service, but they do not fall to the lot of ordinary mortals. For small work, as in assembling the parts of type-writer work, or sewing machine work, the sheet iron plan seems to be quite desirable, though the press board may be preferred by some; either presents a good surface, and that is the main point to be considered.

I have heard considerable complaint lately about the fine tools on the market not being accurate, one tool maker telling me that he bought a four-inch scale on which there was a variation of a sixty-fourth of an inch between the first half inch on the scale and the last half of the fourth inch; it nearly made a blunder for the man in question, and he was not feeling very good over it.

A sixty-fourth of an inch does not seem much to one not accustomed to fine work, but any one that is, well knows what that variation means—generally a spoiled piece of work; and though it might not be the workman's fault, the loss to the employer would not be less on that account. When a man buys a standard scale he naturally expects it is correct within a very small fraction of an inch, and cannot really be blamed if his mistake is caused by the scale, though after being caught once in that manner he would be apt to compare it with a standard the first chance he got, and would do so at all future times.

The shop should furnish all standards for the comparison, and it might be to a firm's advantage to furnish scales also in order to obviate all mistakes of the kind mentioned. A few valuable tools spoiled by the inaccuracy of the workmen's scales would buy as many scales as a shop might need; these could be compared with the shop standard, and any defective scales returned to the makers.

This inaccuracy does not often exist to an appreciable degree in the instruments that are measured with the screw; there are inaccuracies in the screws without a doubt, bnt it is not as noticeable as in the case of the graduated scale, and the screw adjustment seems to give better satisfaction where it can be used.

But this is no excuse for the scales not being accurate, for much work must be laid off from the scale, though there are few men indeed who can see the hundredths division on the scale without the use of the magnifying glass.

The division is too small for scale work; when it comes to lathe work the micrometers can be adjusted and used as fine as is necessary.

For work where exact accuracy is not absolutely necessary, the "caliper rule" is a very handy instrument indeed. I do not mean to throw any discredit on this very useful article, but as it requires reading the scale—and a fine one too—the chance for variation depends upon the operator. For work where one one-hundredth is the allowable variation, they are a most convenient tool—for finer work the micrometer, or the magnifying glass comes into play.

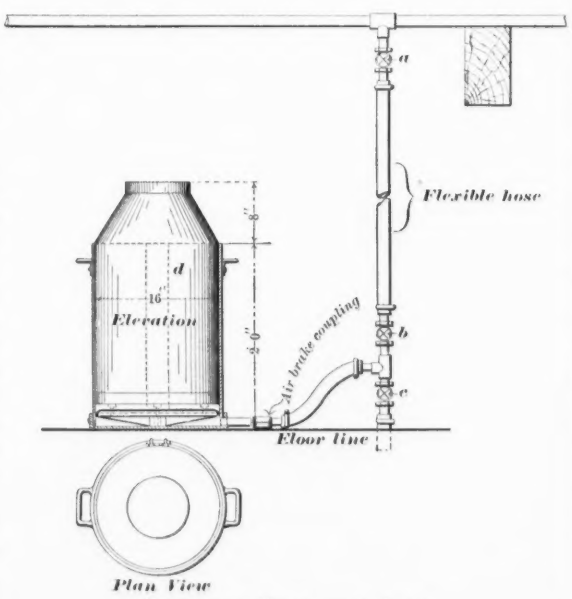
When the prices for standard scales drop below a fair profit, it is time to stop—whether this is the reason for the inaccuracy or not, remains for the makers to explain.

FRED H. COLVIN.

Portable Hydraulic Jack for Car Repairs.

Editor American Machinist:

Herewith I send a drawing of a portable hydraulic jack, such as is used in the D. & H. car repair shops, Onconta. The size here given is the largest of three of similar design. There is an available pressure of eighty pounds per square inch, derived from the village water-works. It will be noticed the supply pipe is carried overhead, resting on the tie beams of roof, one of which is shown. It is arranged so that the part marked "flexible hose" falls to the center of track at convenient distance throughout the length of shop, and each one supplies two jacks, although only one is shown. It is necessary to have a globe valve in each of the parts attached to the air-brake coupling, to regulate the raising of both pistons at the same time. To operate, the valves *a* and *b* are opened, while the one marked *c* is closed, the water flowing to and raising the piston. To lower the piston, the valve *b* is closed and *c* opened, the weight of car forcing the piston down and the water to the sewer; holes being bored in the floor to insert hose, as shown. The cylinder is made of ⅜ in. boiler-iron. In the plan view is shown the construction of joint with strip of iron riveted on the outside. The bottom is made of same material, flanged and riveted on the outside, and all holes countersunk on the inside; it is afterward bored out.



PORTABLE HYDRAULIC JACK.

The piston consists of spider and follower with leather packing between, held together with screws tapped into spider. The piston shaft *d* is made of pine plank pinned together, turned up in lathe and iron bands shrunk on.

The packing is made by pressing the leather into suitable dies after being well soaked in water and held until dry, when it may be stored for future use. I have thought it would be an improvement if the shaft was made of latticed iron-work; it would be lighter, and would not bind in the cylinder, as wood sometimes does. The employes like them as labor-saving machines, but complain of the discomfort of using them, owing to the water wasted on the floor; for it will be seen that, unless the T-piece could be placed lower than the orifice in cylinder, there will be always some water left in the lateral pipe, which will escape when the coupling is detached. It is usual to raise the hose when not in use high enough to be out of the way by small pulley blocks, which can be adjusted either way quickly.

WM. NEWTON.

Pattern Making.

Editor American Machinist:

In reference to Mr. Dingey's comment, in your issue of October 29th, on my plan of a printing press cylinder pattern, published in your issue of October 8th, in which I endeavored to show a much cheaper way of making a printing press cylinder pattern than the one published by Mr. Dingey in your issue of September 7th, permit me to say that the plans I gave October 8th I still believe are all I claim for them, and if Mr. Dingey will confine himself to the point of pattern making, and answer the following questions to the point, without studying the welfare of molders' feet, I think I can convince him of the fact, if such a thing is possible.

I agree with Mr. Dingey that discussions of this kind are good, as they not only set the writers thinking, but the readers also, and I believe Mr. Dingey will have to "think very hard" to show the advantage in favor of what he terms a very plain and simple way of making a printing press cylinder pattern.

To simplify things as much as possible, I will call Mr. Dingey's plan of September 27th plan A, and my plan of October 8th plan B.

Now, Mr. Dingey, does it not cost more to make a cylinder pattern, say 60″ long and 14″ in diameter in halves, with a taper flange or head on top end, and prints on both ends, such as you show in plan A, than to make a cylinder pattern of the same dimensions in one piece, as shown in plan B? Which plan is cheapest, not taking in consideration the future use of the cylinder patterns? Then if you had another cylinder casting to make the same diameter, but longer, you would have to make another cylinder pattern or piece out the one already made; all extra expense above plan B.

Then again, would it not cost more to make a core box as shown in your plan A, say 70″ long (which length would be necessary for your casting 60″ long) and 14″ diameter, with three or four sets of arms in it, with recesses cut out to fit ends of arms, than to make a core box say 16″ long 14″ diameter with one set of arms in it, with plate and stools as shown in plan B, and stick for the molders' gauge thrown in?

As in the case with the cylinder pattern, what would you do to make a longer core out of your core box? With plan B it would be necessary to cut out shorter blocks or stools to make the cores longer—nothing more. Now, Mr. Dingey, which plan is cheapest?

Mr. Dingey says necessity compelled him to discard plan B several years ago, but failed to give any reasons for so doing. If he will kindly state those reasons (if they are not personal), and can show good reasons for doing so I might follow suit, and go behind the age also.

Mr. Dingey says a pattern is a tool; I agree with him, but I have failed so far to

find any one, no matter how fine a tool or pattern he wants made, but what always looks to have it made at the most reasonable cost, especially if he has any competition in his business; hence my remark of cost as a point always to be considered is not very far wrong.

Now for a comparison of plans A and B in the foundry where Mr. Dingey expects to make up for his extravagance in the pattern shop. Large bodies move slowly; the same with large foundry work. If patterns can be made simple and plain, and easy to mold and handle, the work can be done more quickly, and also by second or third rate workmen, and even by apprentices. But as to make a core such as shown in plan A, Mr. Dingey will find that he needs first class or his best paid molders to do it to have any degree of certainty in getting good castings.

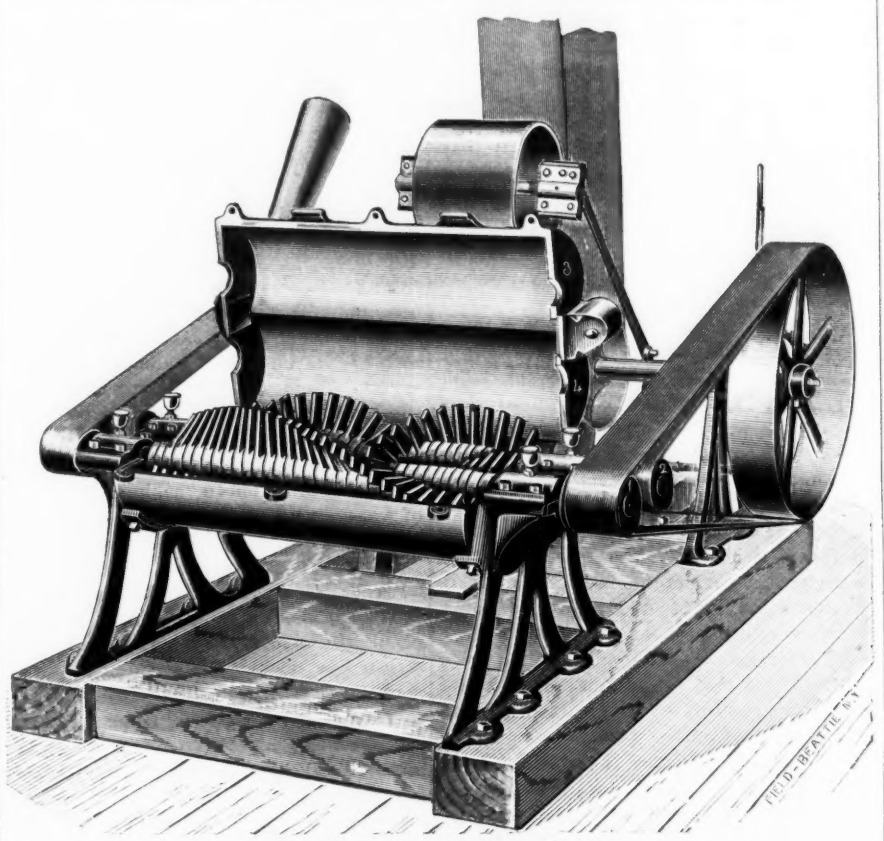
I fail to see where the great saving comes in. And as for the flasks stacked one on top of the other, I think Mr. Dingey will agree with me that there are more chances of the metal running out between two flasks about six feet long, clamped together with two clamps on each side (as they usually are), than for the metal to run out between two flasks about two feet square, as shown in plan B, clamped together in the same manner. GEORGE BRAND.

The Kimble Atomizer.

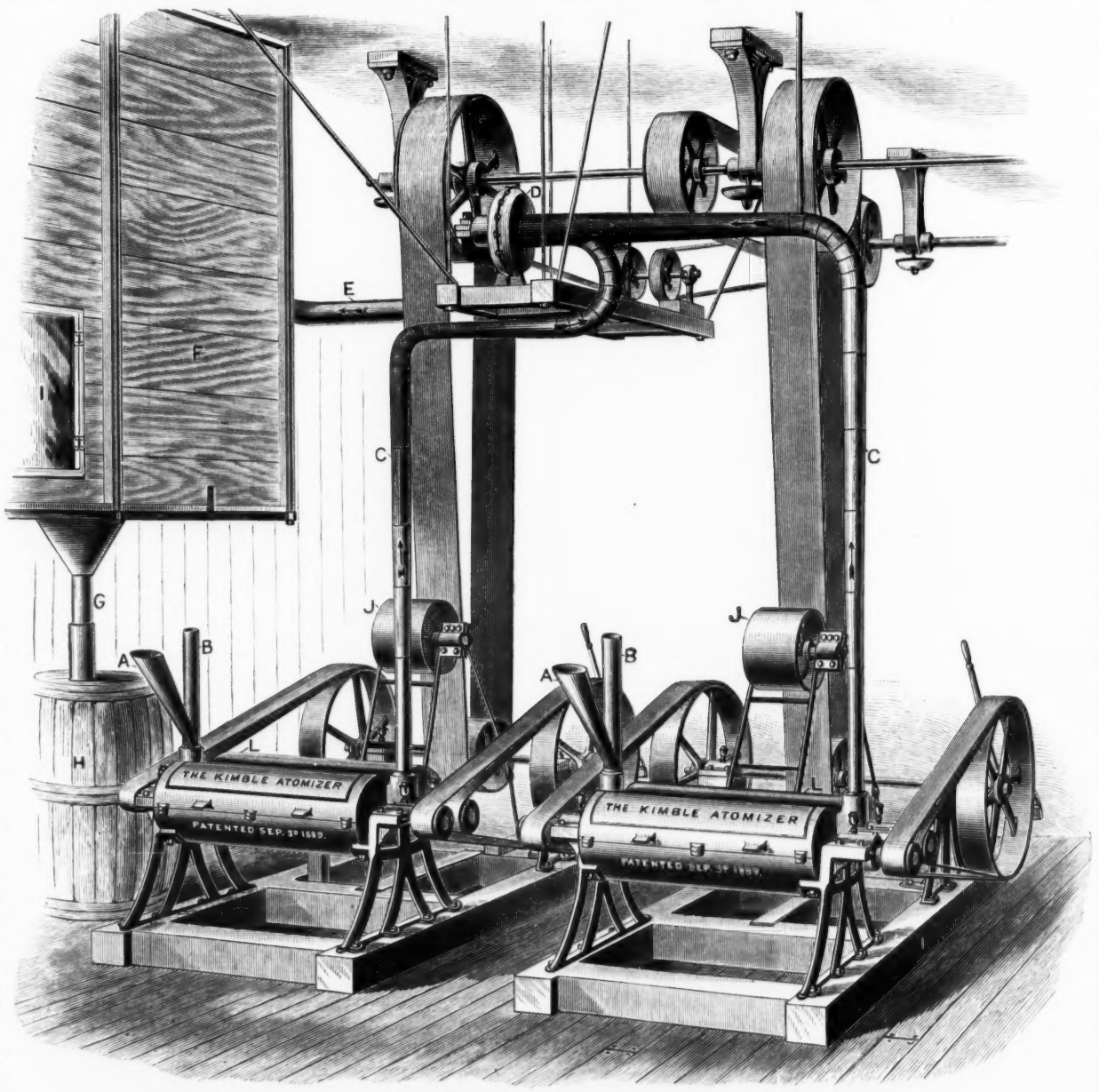
The accompanying illustrations are of a new machine, the object of which is to reduce almost any substance to a powder of any desired degree of fineness, which it accomplishes, not by a grinding operation, but by a series of very rapid blows in connection with rapidly moving currents of air.

The general view, Fig. 1, is the arrangement to be seen on Pearl street, this city, where two machines have been arranged side by side, as shown, for the purpose of testing them, and to show their practical working. As will be seen, the machines are driven from a countershaft overhead, from which are driven two other countershafts, which really form part of the machines, and are placed at the rear of the atomizing cylinders. From these there are run four belts as shown, which drive the beater shafts which are placed inside the cylinders. It will be noticed that these shafts both run in the same direction, and by reference to the smaller engraving, Fig. 2, it will be seen that they carry arms arranged in spiral lines, with spaces between them just sufficient to allow the arms of the other shaft to pass through between; the direction of movement at the moment of passing of the two sets of arms being opposite, *i. e.*, one set of arms passing downward between the cylinders while the other set passes upward.

The speed of the revolving cylinders is from 6,000 to 6,500 revolutions per minute. The shafts are of steel and the arms are of bronze, two arms being cast to a collar which slips over the shaft, and is held by a long feather which passes from end to end, the keyseats in the collar being so located that the arms are arranged spirally, as shown; those on the rear cylinder winding just one complete revolution about the shaft, while those on the front cylinder wind half way around. The case being closed and the machine set in motion, the material to be atomized is fed through the pipes at the left, and, encountering the rapidly revolving arms, is kept in motion by the violent currents of air set up within the case, and is repeatedly struck by the revolving arms until reduced to a powder which is surprisingly even and of any desired degree of fineness. When reduced to the desired degree, it is drawn out by the action of the air current induced by the exhaust fan placed above, and is delivered at any desired point, the machine being entirely automatic in its action. By a consideration of the motions of the two beater shafts, in connection with the fact that the direction of the angle of the spiral of the arms is reversed, so that one of them tends to force the material toward the outlet, while the other tends to force it in the opposite direction at half the rate (owing to the difference in the angle of the spiral), it will be seen that the material is subjected to a number of opposing forces, all, however, tending to the end of thoroughly reducing it to powder.



THE KIMBLE ATOMIZER.—FIG. 2.



THE KIMBLE ATOMIZER.—FIG. 1.

The beater cylinders are 34″ long, and there are thirty beaters, or sixty arms, on each one. There are no set-screws or other parts which can get loose, this being an important consideration, since, of course, if anything should get loose at the speed at which the machine runs, it would probably cause a serious wreck. For the two machines arranged as shown about ten horsepower is required.

The machine was first devised and built by Mr. Kimble for use in the works of the Rail road Mica Lubricant Company, of Denver, of which company he is an officer, and has been used by them for a number of years with great success in pulverizing mica. It has been tested also and found to work admirably in pulverizing roots, spices, sugar, asbestine (a paper filling), sulphates, mineral paints of all kinds, corroded lead, rubber, etc. Where water or oil is used in connection with the material the discharge opening is at the bottom. With none of these materials has the wear of the beaters been found to be at all serious, and in fact with those so far tried sufficiently to determine the rate of wear it has been scarcely perceptible. The machine seen by the writer in this city was pulverizing sugar, the results being admirable in every respect; one curious feature of the case being that the sugar scarcely became attached to the arms or casing at all, only a slight trace of it being here and there perceptible. The machines are quite interesting to a mechanic, and, we believe, embody several new and valuable features. The manufacturer is Mr. S. W. Kimble, 444 Pearl street, New York City.

A Club of Ocean Travelers.

A number of gentlemen in India, whose business or pleasure calls them frequently to England, have formed themselves into what may be termed a travelers' co-operative association, with the object of lessening the expense of their voyages to and from the East. The subscription to this ocean club is to be 350 rupees, payable in monthly installments of ten rupees, there being no annual payment, and members will have the privilege of a free return passage once in three years, paying simply for the bare cost of their food on board. Should a member not be able to take his turn when it comes round, he can sell his ticket for anything he can get for it, not exceeding the total cost of membership. A steamer replete with all the latest improvements is to be built specially for the association, and it is proposed that the first journey to this country shall be made in January, 1893. The vessel is to accommodate 1,000 saloon passengers. — *London Cor. Manchester Courier.*

The United States cruiser Detroit, recently launched at Locust Point, has twin screws and triple expansion engines, which, it is expected, will develop 5,400 indicated horsepower on a speed of eighteen knots. She will be armed with rapid-fire guns, and provided with torpedo ports and other arrangements to make her effective in case of a disturbance. There is every reason to believe that she will prove a valuable addition to the American navy, which is growing up gradually, and not by spasmodic efforts, into a state of efficiency.

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Water Supply and Manufacturers.

Manufacturers, when deciding upon a location, are wise in that respect when they look well after their water supply. Failure to do this often rises up in after years and troubles them, and towns that desire the location of manufacturies are in a good way when one of the inducements they offer is plenty of good water. This people are coming to understand better year by year. Still it is a fact that some pretentious cities are furnished with water so poor in quality that, although it must be used for drinking and for domestic purposes, it will not answer the requirements in certain lines of manufacture in which water of a fairly good quality is required. And it is also a fact that manufacturers have refused to locate in such cities on this account, while others have been obliged to move for lack of fairly good water. There is a demand for more and better water, not only in cities, but in small towns, and this demand—this growing desire—has aided in building up important industries in the manufacture of pumping machinery, and has brought about such healthy competition in its manufacture as to reduce the cost and improve the quality—two very desirable things.

A few years ago a pumping engine was a rather formidable as well asa costly piece of machinery; something no moderately small town could ever hope to own and operate. Pumping engines were luxuries for large cities. Now engines are made for such purposes, so moderate in cost, and so easily erected and managed, that any ambitious town of a few thousand inhabitants cannot afford to be without good water.

One of the commonest faults in securing a water supply is in stopping short of going far enough for it. In fact, it seems to be rather the rule, in the first instance, to consider immediate needs only, rather than to look ahead to future requirements. It costs a little more to go further to the certain supply than to stop short at the supply sure to be inadequate in a few years, but it generally pays in the end, especially in a country like this, where the little town of to-day is the pretentious city of to-morrow, to look for the more than adequate supply.

The greatest activity in providing waterworks has been in the smaller towns. In some large cities notable mistakes have been made, delays having placed them at the mercy of speculators, who have bought up the available supply with the intention of themselves supplying the cities with water. We believe every city should own its own water-works, and supply manufacturers and others at the lowest possible cost that will pay expenses. Doing this induces manufacturers to locate, and thereby increases the general prosperity.

The Chicago Fair.

The World's Fair at Chicago is a fixed fact. And one of the greatest points of attraction at such a fair is "Machinery Hall." At Paris this was beyond question the great center of attraction. Like the little folks who wanted to see "the wheels go around," so older folks like to see the marvelous work of engines and machinery. Manufacturers of machinery in this country should be especially interested in having Machinery Hall second to none ever before shown, and it is none too early for them to conclude what they are to contribute to the exhibit.

Our show of machinery at Paris, though very good so far as it went, did not do justice to this country. Of course, this will not be the case at Chicago; at least, it ought not to be. But to make such a display as will be creditable requires time, and, as before intimated, there is none too much time for manufacturers to determine what they will exhibit, and to get their exhibits ready.

Nothing interests observers more than to see machinery in motion doing the work for which it was intended. This was one of the attractions at the Philadelphia Fair, and no doubt, will be fully attended to by American, and, we hope, by foreign exhibitors, at Chicago. By this means some kind of intelligent comparison can be made, and at the same time visitors are both amused and instructed.

Recognition of Eli Whitney's Services.

The statement that a monument is to be erected in Georgia in commemoration of the services of Eli Whitney, the inventor of the cotton gin, is likely to lead to some reflections upon the arts of peace and those of war. The cotton gin made possible, or practicable, one of the greatest industries of this country—the raising and manufacture of cotton. Yet it brought nothing but discouragement and financial trouble to the inventor. This invention—the cotton gin—was something that made some of the comforts of life more easily obtainable by the masses. So far as Whitney was concerned, speaking from a financial standpoint, his effort was a failure. So later on he gave up his efforts to make implements of peace, and turned his attention to making implements of war—guns for the government. In this he secured a reasonable competency.

It is a very proper thing, indeed, for the citizens of Georgia, which State is representative of a section of the country that was peculiarly benefited by the advent of the cotton gin, to raise a monument to the memory of Whitney. Yet it is impossible to resist the feeling that some substantial recognition of his services while he was yet alive would have been more acceptable to him, and more encouraging to others.

Still it is encouraging to note that since Whitney's time there has been such a change in affairs that a man has no longer to invent instruments for destroying life in order to make money by his inventions.

There seems to be a growing feeling in Europe that war there cannot be much longer delayed, and this feeling is leading to a largely increased immigration to this country, the fear of being forced into the army being the great incentive. Speaking of this, the *Tribune* says:

Nearly twice as many immigrants landed at the barge office last week as in the same week of last year. For the same week last year 3,493 persons were landed. Last week there were 6,436. A remarkably large percentage of these were young Germans, who had emigrated to avoid military conscription, believing that there would be a war in the spring. German after German told the same story when examined by the registry clerk; they had emigrated to avoid military duty, and firmly believed that there would be a European war in the spring.

This increased immigration is not, we believe, of any especial advantage to this country, still there is the satisfaction of knowing that men who flee from the fears of being called upon to do military duty are likely to be able to earn a living here, if they find the opportunity, although their sense of patriotism may be rather deficient.

There is no means of correctly estimating the amount of English capital that has been invested in the manufacturing interests of this country during the past few years; but in the aggregate it must be something enormous, reaching away up among the millions in individual instances. Just why these English investors are so willing to put their money into manufacturing business from which American investors stand aloof, is not very clear. It cannot be the difference in the rate of interest, for the English syndicates not infrequently pay extravagant prices for the concerns they buy out. It probably results from more shrewdness on the part of the managers of such syndicates as to what constitutes a really solid and desirable investment. Under present conditions, European investors in this country are likely to take home to themselves a good deal of the product of labor in this country, to which their boldness in financial matters rather entitles them.

It is reported that one of the great street railway systems of Chicago is to experiment with steam locomotives brought from France. Of course this road could get all the locomotives required for this purpose in this country, but if those made in France are better for the purpose then it is a good thing to find it out. There have been already a good many efforts in this country to use steam and compressed air locomotives, but, generally speaking, these efforts have not been successful.

If some one in Paris can furnish us with what is needed for the purpose we hope he will find ample sale for what he makes, even though Yankee pride gets a shock.

Literary Notes.

CENTRAL STATION MANAGEMENT AND FINANCE, by Horatio A. Foster, Member American Institute Electrical Engineers; Special Census Agent for Central Stations.

The aim of the author is best stated by quoting a part of the preface: "It has been the aim throughout to develop a practical plan applicable to the vast majority of central stations in this country, and to lay down rules not only for a good scheme of organization, but for a satisfactory basis of account keeping. The text embodies a large number of forms, blanks, sheets, registers, tickets, labels, analyses, etc., such as have been in actual use by the writer, and the regular employment of which has added greatly to the efficiency and earning capacity of central stations with which he has been connected. Interspersed in the text will be found many hints and suggestions that deal with station operation, and that bring out the close relationship between sound engineering and scientific bookkeeping. In a station that is properly conducted, the system of organization that is established in the dynamo room and the engine room will run through to the last figure of its balance sheet. While almost any of the blanks may be used individually, the author recommends a close adherence to the general scheme he has worked out."

We believe the author has succeeded in bringing out a valuable work, and it will be of great aid to those interested in the management of finance of central stations and this class of bookkeeping. The book is published by C. C. Shelley, publishers, 10 and 12 College place, New York. Price of the book is not given.

HOW TO BECOME AN ENGINEER; or the Theoretical and Practical Training Necessary in Fitting for the Duties of the Civil Engineer. The Opinions of Eminent Authorities, and the Courses of Study in the Technical Schools. By Geo. W. Plympton, Am. Soc. C. E.

This book treats on the systematic course of study pursued in the schools and colleges of the different countries, including those of the United States, and the leading educational institutions in Great Britain and Ireland where instruction is given bearing on the profession of engineering, such as King's College, London; University College, London; Royal School of Mines, London; University of Edinburgh; Glasgow University; Owens College, Manchester. The course of instruction in institutions in France, Holland, Russia, Prussia, Baden, Austria and Switzerland are also given. These are followed by opinions of prominent engineers regarding the preparatory training for the profession. The whole forms very interesting reading, and those who are interested in educational matters should procure a copy. The book is published by D. Van Nostrand Company, 23 Murray and 27 Warren streets, New York. Price of the book is 50 cents.

HOW TO MAKE INVENTIONS; or Inventing as a Science and an Art. A Practical Guide for Inventors. By Edward P. Thompson, M. E., Member American Society of Mechanical Engineers; Member, an Examiner and an ex-Manager American Institute of Electrical Engineers; Member New York Electrical Society.

This book, as its title indicates, is intended for a guide to inventors, but it may also be read with profit by others, and will serve to instill a desire for a greater familiarity with scientific subjects. The chapters relating to acoustic principles, principles in heat and light, principles in chemistry, principles in electricity, all of which may be used as tools for making scientific inventions, abound with useful information given in a plain, concise and pleasing style. The chapters relating to the foundation of the science of invention; how to learn what to invent; suggestive ideas; the initial step; making and

developing mechanical and scientific inventions, are invaluable to those who wish to make invention a business, and provide themselves with means of preparation. It should be in the hands of all inventors. The book is published by D. Van Nostrand Company, 23 Murray and 27 Warren streets, New York. Price $1. Paper cover.

QUESTIONS AND ANSWERS.

Questions of general interest relating to subjects discussed in our columns will receive attention in this department. The writer's name and address should always accompany the question. Neither correct initials nor location will be published when there is a request to that effect. If questions are enclosed with a business communication, they should be written on a separate sheet.

(502) J. H. D., Akron, Ohio, writes: Kindly give directions for making a good transfer or impression, either black or blue, on paper. *A.*—If you refer to the blue-printing process, you will find complete directions in answer to Question 117, in our issue of March 5, current volume.

(503) T. L., Lynn, Mass., writes: Kindly inform me through your columns how to find the diameters of stepped speed cones. Please give rule for open and cross belts. *A.*—See answer to Question 325, in our issue of August 21, 1890. For a more extended treatment of the subject see our issue of December 1, 1888.

(504) G. H. H., Philadelphia, writes: I would like to know what metal used in a lead screw nut for a lathe gives the best results, and why. *A.*—We favor good babbitt metal for this purpose, because we think it wears the screw less than a solid cast nut, and can much more easily be replaced true with the screw when worn. 2. Some time ago, in speaking of ball bearings for lathes and drills, you said the balls were ground. How is this done? *A.*—You will find a description of the process in our issue of April 18, 1889. 3. In a great many gear cutters the dividing worm-wheel is made in halves. Why is this done? Is it for taking up the wear? Why have they no means of adjustment? *A.*—The wheels are made in two parts in order to eliminate errors. The two parts of the wheel are first put together and cut around by indexing, after which they are partially hobbed; the two parts are then loosened from each other, one of them turned half-way around and again fastened. The hobbing is then continued. A little consideration will show you that this should, and probably does, very nearly eliminate errors in the indexing or hobbing, and make the teeth very nearly uniform. We do not at present recall the name of any other firm than that you mention that makes involute gear cutters.

(505) J. R., ——, asks: 1. Why are not governors more extensively used on marine engines? *A.*—Because the problem of making a governor that will work successfully on a marine engine is a difficult one, and it is only recently that one has been devised that seems to bid fair to be successful. Another reason is that no governor is needed except to prevent racing in rough weather, or in case the screw or shaft is broken, and the importance of having a governor does not appeal to steamship owners so strongly as to those who operate stationary engines, in which uniform speed is of prime importance. 2. How would you set the taper attachment on a Lodge & Davis lathe for a given amount of taper per foot? *A.*—We should set it by the graduations on the end of the bar, these graduations being numbered to indicate the taper per foot given by them. 3. Could you not publish a tabulated scale of wages paid to machinists in the different States? *A.*—No, we could not. Wages not only vary with locality, but with the character of the work done, skill and experience of the men, etc. The rates of wages paid to machinists in New York City vary as widely as between any two localities in the country, and we presume it is much the same in other places. 4. Would you advise a boy with limited means to take a course in mechanical engineering in this country or in Europe? *A.*—If he feels the need of such a course, we should advise him to take it in this country or in Europe, whichever was most convenient for him.

(506) W. W., Naugatuck, Conn., writes: In looking over some of my old AMERICAN MACHINIST's issues, I found in the issue of November 7th, 1889, a rule for spiral springs. Now in computing the number of coils in a spring it says: "An ordinary 3-inch valve lifts perhaps $\frac{1}{12}$ of an inch, and therefore $E \times N$; this amount must not exceed $\frac{8}{100}$ of $E \times N$. We require, therefore, to find E by formula given:

$$E = \frac{D^3\ W}{22d^4} = \frac{64 \times 700}{22 \times 9.115} = .223$$

of an inch per coil. Therefore the total extension will be $.223 \times N$, and as $\frac{1}{12}$ of an inch is to be $\frac{8}{100}$ pounds of $E \times N$ we have $\frac{8}{100}$ of $.223\ N = \frac{1}{12}$". Therefore $.669\ N = 8.5$, or $N = 12.7$, or nearly 13 complete coils. Will you please explain how $.669\ N = 8.5$, or $N = 12.7$ has been obtained? This part I cannot understand, and if any one should ask me about it I should be compelled to say I do not know. *A.*—These figures are obtained thus: The original equation is $\frac{8}{100}$ of $.223\ N = \frac{1}{12}$, which may be written

$$\frac{.669}{100}\ N = \frac{1}{12}.$$

Now multiplying both members of the equation by 100, so as to get rid of the fractions, we have

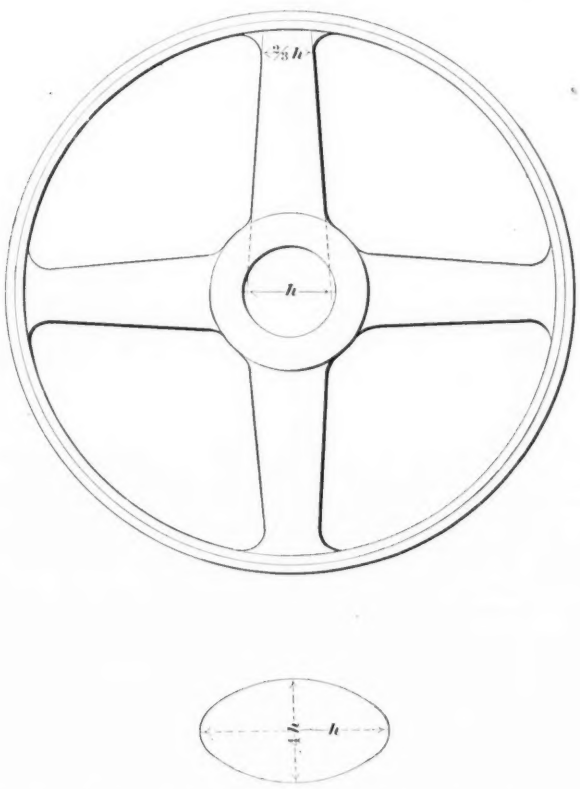
$$.669\ N = \frac{100}{12} = 8.5.$$

Here then we have

$$.669\ N = 8.5.$$

Now to find the value of N we have simply to divide 8.5 by .669, which gives us

$$N = \frac{8.5}{.669} = 12.7.$$



(507) F. A. R., Fort Wayne, Ind., writes: In Mr. J. Tribe's articles on the compound engine he tells us that the ratio of expansion is equal to the absolute initial pressure divided by the absolute terminal pressure. Your rule for obtaining the mean effective pressure is to add 1 to the hyperbolic logarithm of the number of expansions, then divide by the number of expansions, and multiply by the absolute initial pressure. Now it seems to me that this rule is not applicable to condensing engines, because in a condensing engine the hyperbolic curve does not extend all the way down to the terminal pressure (which in Mr. Tribe's table No. 2 = 6.5 pounds, giving twenty expansions in table No. 3). Would it not be more correct to use the hyperbolic logarithm for that part of the card above the point of release, and then add to the mean effective pressure, so found, 10 or 12 pounds extra for vacuum? If we apply the rule to an actual example, we will have a better showing for the non condensing than for the condensing engine, which would indicate a fallacy somewhere. *A.*—If you will look at our rule again you will find that you are in error. The rule is: Add 1 to the hyperbolic logarithm of the number of expansions, divide this sum by the number of expansions, and multiply the quotient by the absolute initial pressure; the result will be the *mean pressure*, not the mean effective pressure; for finding the latter deduct the back pressure from the mean pressure; the remainder will be the *mean effective pressure*. In a condensing engine the hyperbolic curve or expansion curve extends downwards to the point of release at which the terminal pressure is measured, just the same as in a non-condensing engine, and therefore the rule for finding the mean effective pressure is applicable in both classes of engines. Of course care must be taken to measure the initial pressure and back pressure from the zero line, so as to obtain absolute pressures in all cases; and in this way proper credit will be given to the condensing and non-condensing engines. 2. Please explain the philosophy of adding one to the hyperbolic logarithm of the number of expansions. I have been doing it on faith for a long time, and now would like to know the reason. *A.*—See our issue of March 20, 1890.

(508) G. S. C., Elgin, Ill., writes: I got an order to make patterns for a set of pulleys of the following diameters: 12, 14, 16, 18 and 20 inch; the first three are to have 7-inch face; the 18 inch, 9-inch face; and the 20 inch, 9½-inch face. The pulleys are to be used on a line shaft. What I wish to know is: How many arms will be required, and the dimensions of the arms? The arms are to be straight, but the number and size of arms are not specified. How can I find the desired sizes? *A.*—The number of arms is arbitrary; we should use four in each pulley. The dimensions of the arms may be found by the following formula:

$$h = 0.6337 \sqrt[3]{\frac{B\,D}{n}} \text{ for single belts,}$$

and

$$h = 0.798 \sqrt[3]{\frac{B\,D}{n}} \text{ for double belts.}$$

In the above, h denotes the width of the arm in inches supposed to be produced to the center of the shaft, as indicated in the accompanying illustration. B the breadth, and D the diameter of the rim in inches; and n the number of arms. To show the application of these formulas, let us find the dimensions of the arms for the pulley 12 inches in diameter for a single belt. Substituting in the first formula for the symbols their values, we have

$$h = 0.6337 \times \sqrt[3]{\frac{7 \times 12}{4}} = 0.6337 \times 2.76$$

$= 1.749$, say $1\frac{3}{4}$ inch.

The breadth of the arm at the rim should be equal to $\frac{3}{8}\ h$; hence we have $\frac{3}{8} \times 1.75 = 1.16$, say $1\frac{3}{16}$ inch for the breadth of the arm at the rim. The thickness of the arm should be equal to $.4h$; hence the thickness at the center of the shaft (the arm being supposed to be produced to the center) will be $1.75 \times .4 = .7$ of an inch; and at the rim the thickness will be $1.16 \times .4 = .464$, say $\frac{1}{2}$ an inch. In a similar way you can find the dimensions of the arms for the other pulleys. The above formulas are for elliptical sections, as indicated in the illustration.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.

Ready-made cut Iron list gears. See page 20.

Link-Belting and Sprocket Wheels.

Send for Catalogue of Link-Belting.

Over 50,000,000 feet of Link-Belt in use.

Link-Belt Engineering Co., Philadelphia and N. Y.

Shafting Straighteners. J. H. Wells, Tampa, Fla.

"Bradley's Power Hammers, the best in the world." 20 sizes. Bradley & Co., Syracuse, N. Y.

Drop Presses, Punches and Shears. Williams, White & Co., Moline, Ill., manufacturers.

Pattern and Brand Letters. A variety of sizes and styles. Heber Wells, 8 Spruce St., New York.

Davis Key-Seating Machines kept in stock by Manning, Maxwell & Moore, 111 Liberty St., N. Y.

"How to Keep Boilers Clean." A 96-page book mailed free by Jas. E. Hotchkiss, 112 Liberty St., N. Y.

Selden Packing for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt St., N. Y.

Light Special Machinery and Tools to order. The Meriden Machine Tool Co., Meriden, Conn.

Our Automatic Gear Cutting Machine will increase production 50%. The Superior Mach. Wks., Clev'd, O.

$13 00 I Dea L. Drawing Stands. The original. Send for postal. W. S. Rogers, Troy, N. Y.

S. A. Smith, 23 South Canal Street, Chicago, Ill., agent for Holbrook's Raw Hide Blanks for Gears.

Adamantine Adhesive, stops leaks in boilers and joints. Charles Barnes & Co., Cincinnati, Ohio.

Save small iron from foundry refuse. It pays. Use the Woodruff Pat. Separating Machine, Audubon Machine Works, New Haven, Conn.

"Roper's Hand-books for Eng'rs and Firemen." Descriptive Catalogue mailed free to any address. Edw. Meeks, Pub., 1012 Walnut St., Phila., Pa.

Thos. Pray, Jr., 193 *Times* Build'g, N. Y., attends to calls for Indicating and Testing Steam Plants, Water-works, Locomotives & S. S.'s. Write or call.

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocum & Son's Shafting Works, Drinker St., Philadelphia, Pa.

S. W. Card & Co., Mansfield, Mass., make everything in the line of Taps and Dies. S. A. Smith, 23 S. Canal St., Chicago, Western Agent.

Most sensitive and durable Damper Regulator made; works within one pound. Send for circular. T. Kieley, 11 W. Thirteenth St., New York.

For the Latest Improved Diamond Prospecting Drill, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

Milliken & D'Amour, No. 151 Cedar Street, New York City, designers and builders of labor-saving and automatic machinery and tools to order.

For Sale—One Payne Engine and Boiler, Automatic Cut-off. In first-class order; but little used. W. P. Davis, Rochester, N. Y.

N. Y. City Bolt & Nut Co., Limited, 33 and 35 Desbrosses St., N. Y. City, manufacturers of Machine Bolts of every description. Write for estimates.

Planer Chucks and 13" Upright Drills. For cuts and price address G. W. Jordan, No. 4 Wayne Street, Worcester, Mass.

25", 32", 37", 42" — "Only Drill Press built on 'Ko-rekt' principles, even if they come from Jersey." Gould & Eberhardt, Newark, N. J.

Complete treatise on Screws and Screw-making, with clear and concise explanation of the methods; 95 illustrations. Price, $1.25 postpaid. E. & F. N. Spon, 12 Cortlandt Street, New York.

"Hawkins' Maxims and Instructions for the Boiler-room." 10 Parts, 25 cents each. Catalogue free. Theo. Audel & Co., Pubs., 91 Liberty St., N. Y.

De Lamater Screw Propeller Wheel, made only by The Samuel L. Moore & Sons Co., Elizabethport, N. J., who have purchased from C. H. De Lamater & Co., New York, all their patterns, books of record, gauges, etc. Location and equipment well adapted for Heavy Steamship Repairs.

Club Rates.—If no one is getting up a club for the AMERICAN MACHINIST in your town or establishment, send for Circular of New Club Rates, and try it yourself. Address AMERICAN MACHINIST, 96 Fulton St., New York.

"Binders" for the AMERICAN MACHINIST. Two styles—the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers with full page opening flat. Either will hold the entire 52 issues of any volume. American Machinist Publishing Co., 96 Fulton St., New York.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator and making all required calculations from the diagram, also the principles of economy in operating steam engines and current practice in testing engines and boilers. Price, $2 postpaid. Published by John Wiley & Sons, 53 East Tenth Street, New York.

MANUFACTURES.

J. Philbrook will erect a steam-mill at Brunswick, Me.

Boriaird & Seyfang will establish a pipe-mill at Bradford, Pa.

The R. R. Mingus Machine Shops at Glasgow, Ky., are to be rebuilt.

The Record Manufacturing Company will enlarge its plant at Conneaut, Ohio.

There is a possibility of an iron smelting plant establishing at Cheyenne, Utah.

Work will soon commence on the new electric power station at Salem, Mass.

W. H. Cocking, of Blue Spring, is erecting a lead smelter at Chattanooga, Tenn.

There is a possibility of an electric lighting plant being established at Muncie, Pa.

The Flenniken Turbine Company, of Dubuque, Ia., propose to enlarge their plant.

Conrad Litchenhahan has erected a blacksmith and machine shop at Tamaqua, Pa.

The construction of an iron bridge across Beaver Creek, Bristol, Tenn., is talked of.

D. Zachow & Besserdick will erect a machine shop and foundry at Clintonville, Wis.

The Texas & Pacific Railroad Co. (office, Dallas,) will erect a repair shop in El Paso, Tex.

Lybass & Rogers will double the capacity of their carriage and wagon works at Bartow, Fla.

The Little Rock (Ark.) Manufacturing and Tool Company will rebuild its plant, recently burned.

It is stated that negotiations are pending for the removal of a nail factory to Newport News, Va.

Abendroth & Fisher Co., of Birmingham, will, it is stated, erect an iron foundry at Attalla, Ala.

The tin-plate establishment at Piqua, Ohio, is to be extensively enlarged and new machinery added.

The Fort Smith (Ark.) Ice Factory is reported as building an addition and putting in new machinery.

The Vanderbilt Steel and Iron Company will increase the capacity of its plant at Birmingham, Ala.

J. G. Haly, of Philadelphia, Penn., is reported as intending to start a woolen mill at Lavedo, Tex.

An electric light plant will be erected at Bryson City, N. C. For further information address B. B. Lake.

It is understood that the Whittaker Iron Company will establish a tin-plate plant, at Wheeling, W. Va.

The Eagle Iron and Steel Company has been organized, to operate the old rolling-mill at Ironton, O.

A stock company will, it is stated, be organized at Bluffton, Ala., for the purpose of manufacturing excelsior.

C. H. Sterling, Tarboro, N. C., will, it is reported, put in his ice factory another ten-ton ice machine.

The Commercial Association is arranging for the establishment of a cotton-batting factory at Memphis, Tenn.

W. H. Francks and S. F. Rasberry, of Washington, are reported as to erect machine shops in New Berne, N. C.

The American Foundry Company, of Edison, Washington, will erect a plant for the manufacture of car wheels.

The American Spool Bobbin and Shuttle Company, of Boston, Mass., will erect a factory at Burlington, N. Y.

It is stated that the Whitaker Iron Company contemplates the erection of a tin-plate mill at Wheeling, W. Va.

The corner-stone of the North Carolina Steel and Iron Company's blast furnace has been laid at Greensboro, N. C.

The Pennsylvania Railroad Company have broken ground at Renova, Pa., for a passenger car shop 138x238 feet in size.

The American Foundry Company, at Edison, Wash., will erect a plant for the manufacture of car wheels of all kinds.

Efforts are being made for the erection of an electric light plant in Chase City, Va. T. D. Jeffress can give information.

The Lewis Foundry and Machine Company, of Chicago, Ill., is increasing its plant by the erection of a foundry department.

The new foundry and pattern house of the Sullivan Machine Company at Claremont, N. H., will be completed at an early date.

The Lincoln Iron Company, of Rutland, Vt., is to enlarge its plant by the erection of a building 106x50 feet and an ell 16x35 feet.

The St. Louis Screw Co. is preparing plans for a new factory The property was purchased some time ago, and is 150x140 feet.

L. S. Graves & Son, Rochester, N. Y., elevator builders, have purchased the land in the rear of their works, and will build on it.

The Manville (R. I.) Manufacturing Company is increasing the capacity of its plant by putting in three new 150 horse-power boilers.

The Prescott Steam Heating Company, S. C. Poole, president, has been organized in Illinois, to manufacture car-heating apparatus.

The Lynchburg (Va.) Cotton-mill and Improvement Co. will put in its cotton-mill an additional engine and boiler and 5,000 spindles.

Pike Brothers have purchased and will operate W. S. Cox's plow works, at La Grange, Ga.; they will also start a wood-working plant.

J. A. Cornish, of Arkansas, will establish in Pittsburgh, Tex., an iron foundry for the manufacture of his patent grate bars and fire backs.

This is a busy season with the Providence Steam Engine Company. The new brick addition to their works will nearly double their capacity.

The Cohankus Manufacturing Company, of Hohokus, Bergen County, N. J., has been organized, to manufacture cotton, wool and other fibers.

Creswell's Iron Foundry, at Philadelphia, Pa., is to be removed to a new site, where a two-story brick structure 190x70 feet, is being erected.

The Foster Machine Company's new building, at Westfield, Mass., is roofed over, and work on the interior is being pushed as rapidly as possible.

The Riverside Rolling-mill, at Cincinnati, Ohio, has been sold at auction to Judge C. D. Robertson, for $23,000. The appraised value was $40,000.

John F. Pollock, James M. Loring and Charles A. Loring have incorporated the Acme Motor Machine Co., of East St. Louis. The capital stock is $500,000.

Joseph Hull, of Savannah, has purchased the Rome (Ga.) Chemical Works for $40,000; probably will reorganize the company and put the works in operation.

J. H. Gill is putting about $3,000 worth of new machinery in his foundry and machine shops at Ivanhoe, Va., and equipping a plant for building mining cars.

Vanderbilt Furnace at East Birmingham, Ala., now a sixty-five-ton stack, will be enlarged to a 100-ton furnace. The work of enlargement will commence at once.

A passenger station, 75 feet in length and 24 feet in width, is to be erected at Edison, Wash., on the Pacific division of the Northern Pacific. The estimated cost is $28,000.

The Richey Manufacturing Company, at Chicago, will manufacture fuel oil gas generators; capital stock, $10,000; incorporators, F. W. Richey, W. W. Knowles, and others.

The South Chicago Steel Casting Company, at Chicago, will manufacture steel castings; capital stock, $20,000; incorporators, Frederick Arnd, C. M. Walker and A. F. Evans.

A stock company will be organized to erect works for the manufacture of boilers, cotton gins, plows, etc., at Little Rock, Ark. E. C. Wehrfritz can give further particulars.

The Owensboro (Ky.) Falls of Rough & Green River Railroad Company will erect several additional buildings at its machine shops, and equip them with new machinery.

The rumor as to the erection of a cotton-mill at Carthage, N. C., is confirmed. It will be a 2,000-spindle-mill, and be erected early next year by a company already organized.

The Little Bros. Fertilizer and Phosphate Company, South Jacksonville, Fla., has increased its capital stock to $175,000, and will increase the capacity of its fertilizer factory.

The Omaha and Grant Smelting and Refining Company will erect a copper plant at Omaha, Neb. It will be 150x80 feet in size, and will be equipped with $75,000 worth of machinery.

The Vanderbilt Steel and Iron Company, Birmingham, Ala., G. O. Vanderbilt, of Princeton, N. J., president, will enlarge its furnace at East Birmingham, from 65 to 100 tons capacity.

The Western Tap and Die Company, at Chicago, will manufacture taps, dies, machines, specialties, etc. Capital stock, $12,000; incorporators, F. B. Furniss, L. Furniss and G. F. Worth.

It is stated that the Southern Steel Co., Chattanooga, Tenn., will greatly enlarge its department for the making of steel by the Bessemer basic process, erecting two ten-ton converters.

H. S. Sands and Q. S. McKinney, of Fairmont; G. C. Sturgess and others have incorporated the Morgantown (W. Va.) Electric Light and Power Company, with a capital stock of $100,000.

The Atlas Electrical Mfg. Company, at Chicago, propose to manufacture dynamos, motors, etc.; capital stock, $12,000; incorporators, M. F. Matteson, Q. A. Stephenson and J. B. Albertson.

The Donaldsonville (La.) Ice and Electric Light Co. has (stock $25,000, all taken) been organized for the purposes above indicated. The company is completely organized and ready for operations.

It is stated that northern parties have made a proposition for the establishment in San Antonio, Tex., of a rolling-mill, iron and steel plant, and nail and wire works, at a total cost of about $2,000,000.

The Acme Railway Switch Company, of East St. Louis, has been organized, to manufacture the automatic lock-geared railway switch. The incorporators are J. E. Chambers, George Broach, Charles E. Long.

The Thayer & Britton Company, of Chicago, has been incorporated, to manufacture car and locomotive bearings and railroad supplies. The incorporators are: F. W. Thayer, F. H. Britton, Louis Danziger.

Articles of incorporation have been filed by the J. H. Kerrick Machinery Company at Minneapolis, Minn. The capital is $50,000, and the business will be that of manufacturing iron and wood-working machinery.

The Jenifer (Ala.) Iron Co. will, it is reported, enlarge its iron furnace and increase its capacity from thirty-five to fifty tons daily. It is also said that the company contemplates erecting a cotton tie factory.

W. H. Siferd, of Ohio, and others will probably locate in Pittsburgh, Tex., works for the manufactures of engines, boilers, cane and saw-mill, in consideration of a $15,000 bonus. The mayor can give information.

The Pennsylvania Tube Works, Pittsburgh, Pa., will be increased by the addition of a furnace and all necessary machinery for making 36-inch pipe. The capacity of the plant will be increased by 90 to 100 tons daily.

The new Union Iron Works, in course of erection at Buffalo, N. Y., are rapidly assuming proportions, and it is expected that the work of construction will be completed and the works put in operation by June 1 next.

The Radford (Va.) Pipe and Foundry Company's plant is fast nearing completion, and it soon will be in operation. The company has a large number of orders already placed, and will commence with nearly a full force.

The new tin-plate mill at Irondale, O., has been started up, and the tinning-mill will be started up in two weeks. These two new mills will give employment to 125 new men. The mill is owned by Wallance, Banfield & Co.

The Roller Bearing Cycle Company, at Chicago, have been formed, to manufacture bicycles and machines of like character; capital stock, $200,000; incorporators, Alfred D. Barnes, Horatio Keeler and George F. Barrett.

Morris Adler and William Berney, of Birmingham, and J. N. Carpenter, of Natchez, Miss., have purchased the Bessemer (Ala.) Rolling-mill for $100,000, and will, it is stated, enlarge same and put in a number of puddling furnaces.

The Connell & Dengler Machine Company, capitalized at $100,000 have been incorporated, at Rochester, N. Y. The object of the company is to manufacture and sell machinery and machinery supplies, and to operate a foundry.

The Bethlehem Foundry and Machine Company's shops at South Bethlehem, Pa., are running to their utmost capacity, and it is stated that the company contemplates erecting new and larger works in order to meet the demands of trade.

Richard Monarch will establish a woolen-mill at Owensboro, Ky. He will remodel a building for the use of the mill, and has closed contract for the removal of machinery in his mill at that place; also considerable new machinery will be put in.

Charles Heaton, W. H. Lemmons, W. and W. D. Howe have incorporated the Southern Emery Wheel Company to erect and operate works at Tallapoosa, Ga., for the manufacture of emery and corundum wheels, etc. The capital stock is to be $25,000.

The new shops of the Northampton Emery Wheel Co., at Leeds, Mass., are completed and nearly ready for occupancy. These shops will be used for the manufacture of emery-grinding tools, the old ones being given up to the production of emery wheels.

E. C. Stearns & Co., Syracuse, N. Y., have completed a four-story addition to their existing hardware manufacturing plant, for the manufacture of bicycles. The new building is 60x150 feet, and is to be equipped with machinery in time to get a line of bicycles on the market by next spring.

It is reported that H. Simon and others have purchased 1,000 acres of land near Birmingham, Ala., and will establish a town, to be known as Shadeville. It is said that the company will construct an iron furnace, erect a silk-mill and other industries, with H. English as general manager.

Ground has been broken for a new butt-weld-mill at the works of the Duquesne Tube Works Company, Duquesne, Pa. The building will be in two parts of equal size, which together will make a structure 259 feet long and 120 feet wide. The plant will have an initial daily capacity of 25 tons.

The Inventors' Manufacturing Co., of Youngstown, O., have been granted a charter, with a capital stock of $1,000. The incorporators are: E. M. Taylor, C. E. Walton, L. T. Tyrell, B. F. Campbell and Fred. C. Brown, all of Youngstown. The object of the company is to manufacture and sell novelties.

The Taylor (Tex.) Electric Light, Gas and Power Company has been organized, to erect an electric light plant at a cost of $20,000; contract has been let. E. W. Pike, of Chicago, Ill., is president; J. E. Tucker, vice-president, and E. L. Welch, secretary. The company has obtained charter; capital stock, $40,000.

A fire at the works of the Central Iron and Steel Co., of Brazil, Ind., on the morning of October 30, partially destroyed the turnbuckle department. The work of rebuilding the department will be finished in a few weeks. The company is able to promptly fill all orders for turnbuckles, having a large stock on hand.

The Williams Engine Works, Baltimore, Md., write us: "We hope to have our plant in operation by December 1. As we are the only builders of high-speed automatic engines south of Mason & Dixon's line, we hope to control an extensive trade. We have some new ideas which we hope will command attention."

The Steel Truss Car Wheel Company, of Edwardsville, Ill., has begun the manufacture of car wheels. The projectors intend to enlarge the plant and increase the working force as the business requires. Jacob Dunstedter is the inventor of the wheel, and president of the company, and Gustav Cramer, of St. Louis, vice-president and treasurer.

The Souder Railway Freight Car Co. has been incorporated at Newport, Ky., by John J. May, Philip Engelskirger, E. E. Hughes and others. The company has been formed for the purpose of manufacturing all kinds of freight cars for railways according to the patents of Jacob J. Souder, of Washington, D. C. The capital stock is $2,000,000.

The Metropolitan Electric Railway Co., of Washington, D. C., are about ready to start up their extensive plant. The plant includes three compound engines and three of De Rycke's "straight line" separators. The same separator admits, reheats and separates the water from the exhaust steam of the high pressure cylinder, and conducts it to the low-pressure cylinder.

There is water-works agitation in Princeton, Ky.; Guthrie, Okla Ter.; Natchez, Miss.; Hope, Ark.; Shenandoah, Pa.; Arcola, Ill.; Oshkosh, Wis.; Ludlow, Ky.; Stockbridge, Mass.; Brookfield, Mo.; Kent, Wash.; Lander, Wyo; Port Jervis, N. Y.; Pasadena, Cal.; Columbus, Ga.; Colton, Cal.; Atlanta, Ga; Pittsfield, Mass.; Kansas City, Mo.; Clifton Springs, N. Y.; Trenton, N. J.; New Braunfels, Tex.

It is said that the abandoned dynamo factory at Dover, N. J., will be used for a machine shop. Mr. Cyrus Currier, of Newark, who, with James A. Goodale and William H. Baker, purchased the property, does such an extensive business in his machine shops in that city that he is overcrowded, and has about decided to utilize the factory building mentioned as an annex to his Newark works.

The Union Drawn Steel Co., Beaver Falls, Pa., make a specialty of cold-rolled iron and steel shafting for all purposes, and give special attention to piston rods, pump rods, slides and shapes. The company claim to be able to split thousandths. All forms of drawn work will be accepted at the works. Thos. Towne is eastern agent, with offices at corner Liberty and Washington streets, New York.

The eastern department of the Akron Iron Co., 122 Liberty street, New York, and 54 Purchase street, Boston, has issued a very complete catalogue of power-transmitting machinery, shafting pulleys, hangers, couplings, and other appliances, which will interest mechanics and engineers. In addition to the matter pertaining to the specialties made by the company, the catalogue contains tables of interest to mechanics and engineers.

The Lackawanna Lubricating Co., 1212 Capouse avenue, Scranton, Pa., have erected a brick machine shop and foundry at the above address for the manufacture of their well-known grease cups and cylinder lubricators. This step has been rendered necessary by the constantly increasing demands for their goods among those who appreciate economical and effective lubrication. The Lackawanna Company claim to turn out only first-class work at prices that cannot fail to be satisfactory.

The Joliet Sheet Rolling-mill Company has been organized, to erect at Joliet, Ill., a plant for the manufacture of iron and steel sheets. The general manager of the enterprise will be Samuel Fewtrill, who has for many years been connected with the Joliet Steel Works. At a meeting held last week in Joliet many of the prominent business men of the city were in attendance and subscribed liberally to the stock of the company. A site comprising some twenty acres has been secured in a favorable location.

The St. Louis & Suburban Railway Company, formerly a combined cable and steam railroad, but which has recently been changed to an electric line, has had some remarkable experiences at their new power plant. As in all electric railway stations, the work varies enormously, sometimes changing from nothing to over 600 horse-power in less than one minute. This has caused the boilers to foam or prime, and on two occasions it is reported that the large Corliss engine would certainly have been wrecked had it not been for the Pond separator, which is located in the main steam pipe near the engine. Two additional Corliss engines are now being installed, and they also will be protected by the Pond separator. This device for removing the entrained water from the steam is manufactured by the Pond Engineering Co., St. Louis. They report additional orders from M. Beatty & Son, Welland, Ont.; Union Manufacturing Co., Champaign, Ill.; Du Pont Paper Co., Louisville, Ky.; Cicero & Proviso Railway, Chicago, Ill., two St. Louis Smelting and Refining Co., St. Louis; John Ramming, St. Louis.

We have the following from Benjamin Sebastian, Jr., which will explain itself: "Having disposed of all my interests in and severed my connection with the Sebastian-May Co., of Sidney, O., with which concern I have been connected for the past eight years, I take pleasure in informing my friends and the machinery trade in general that I have resumed business in Cincinnati, O., under the name and style of Sebastian Lathe Co., of which I am the sole proprietor, and I will at once commence the manufacture of a complete line of foot and power lathes of the very latest and most approved designs. It shall be my aim to establish a reputation for my tools for exactness, convenience, elegance, and adaptation to the end sought, which shall be second to none. Every opportunity for improvement will be accepted, and no device that could add to the usefulness of the tools will be neglected. Having equipped my works with the best machinery, specially adapted to the work proposed, and employing only the most skilful labor, I can with confidence offer the tools of my manufacture, believing that they will meet with the approval of the most exacting." His shops are 41-45 Central avenue.

The Morton Mfg. Co., Muskegon, Mich., write us: Our business is very good, and prospects are that we will not be able to fill orders soon enough. Among our recent shipments are the following machines: One No. 4 sixteen-inch stroke keyway cutter with key-making attachment to the Washburn & Moen Mfg. Co., Worcester, Mass.; L. Spence & Son, Martins Ferry, O.; Shaw Electric Crane Works, Muskegon, Mich.; and the Lakeside Iron Works, Muskegon, Mich. One 36-inch stroke portable keyway cutter to the Risdon Iron and Locomotive Works; Union Iron Works, San Francisco, Cal.; Eclipse Machine Works, Philadelphia, Pa.; South Boston Iron Works, Boston, Mass. One ten-inch stroke portable keyway cutter to J. W. Ruger & Co., Buffalo, N. Y.; Detroit Electrical Works, Detroit, Mich.; and Robert Thrope & Co., Three Rivers, Mich. No. 6 twenty-four-inch stroke keyway cutter with key-making attachment to the Webster Mfg. Co., Chicago, Ill.; also have built and furnished the Walker Mfg. Co., of Cleveland, O., the largest keyway cutter known of, having a six-foot stroke cutting six inches wide, this being the third machine sold to the Walker Co. We are now nicely situated in our new factory, and have room for our rapidly growing business.

Points Obtained from a Machine Shop in Hartford.

BY JARNO.

During the last half year I have several times tried to write, but the old interest would not come back. Now, however, I have come across a friend's letter, which I have but to copy, ink in sketches, and send to the editor.

A wheel that is held on its shaft by a tapering pin may have been put on easily enough, but, after the pin has been driven in and out, the wheel may come off quite hard. This may be caused by the pins having thrown up a burr around the pin hole in the shaft, as at *b*, Fig. 1, which acts as a rivet whose head must be sheared off before the wheel can be moved. A preventive of this is to countersink each end of the pin hole, as at *a*. This has been done for years with entire success. I should not call your attention to this, had I not seen, only the other day, a man in a neighboring shop tugging at a wheel which he said had always before come off easily. Simply he had driven the pin in the one time more, which had riveted the wheel to the shaft.

The burr thrown up from a shaft around the seat of a set-screw will sometimes make a wheel come off hard. A remedy is shown in Fig. 2; a groove *c*, a little wider than the diameter of the end of the screw, is turned in the shaft, and under the screw which is now seated in the groove. I said that this is a remedy for the burr; I do not mean that it is a cure, for the burr is still thrown up at the bottom of the groove, but not high enough to interfere with the wheel. At first it was questioned whether shafts would keep straight with this method of fastening; but when well fitted, and the slots are not too wide, the crooking of shafts has given no trouble.

The importance of the third point is general, as it relates to nothing less than standard gauges. One of the better kinds of ring gauges is solid, of steel hardened and ground to size. This might be the ideal gauge, if it could be made hard enough not to wear out; but, unfortunately, or fortunately, this has not yet been done. It is an excellent gauge, in the hands of a careful workman, to keep test tools to the right size, but it cannot be safely let out into the shop for sizing work, as there is nearly always some one that will force it on a piece of work that is running in a lathe. When so forced, it wears out surprisingly soon, and yet with so insidious steps as often not to be noted until beginning to assemble parts, when it is found that they will not go together, because some are oversized. Now there is a long story of troubles. Some one has to retrace steps, and decide what parts shall be changed. A new gauge is obtained, things settle into their old routine until more wearings, and so on indefinitely. These troubles can be avoided by beginning with the idea that gauges will wear out, by making them adjustable, and attending to the adjusting before using. Starting with this idea, we can make our gauge of cast-iron. Fig. 3 is such a gauge. The sizing sleeve *f* fits into the collar or ring *e*, with a taper one-eighth inch to the foot. A slanting slot *g* is cut through one side of the sleeve, to admit adjustment. The nut *d* forces the sleeve in, and makes the sizing hole smaller, and the screws *h* keep it from going in too far. In making the gauge, the hole is lapped to size; if it wears larger at the ends, it is also lapped to make it of the same diameter throughout. By this operation of lapping, the hole is rendered well nigh as durable as one in hardened steel. If he can avoid it, a good workman will not polish, with emery, a piece of cast-iron, into which he must afterward drill holes, because the emery would charge the surface and wear out the drill. It would be interesting to know to what extent it is practical to render surfaces more durable by rolling into them some hard substance in powder. After this gauge has been used and returned to the tool-room, it is examined, and, if necessary, adjusted to a standard plug that is kept only for reference.

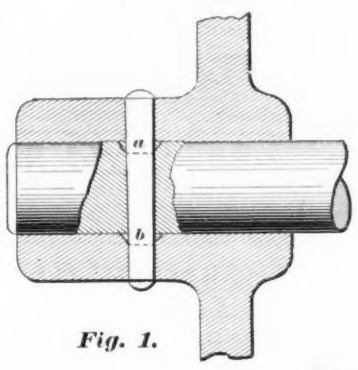


Fig. 1.

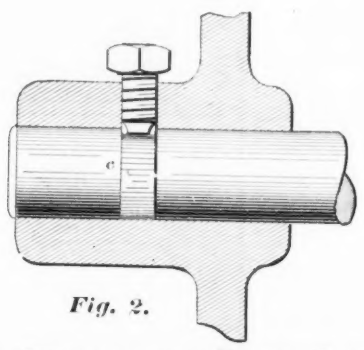


Fig. 2.

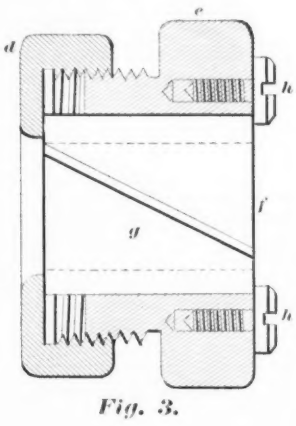


Fig. 3.

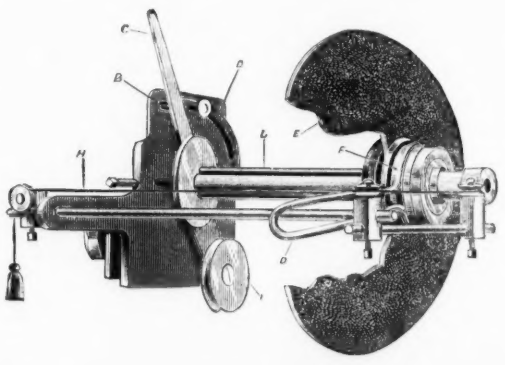
POINTS OBTAINED FROM A MACHINE SHOP.

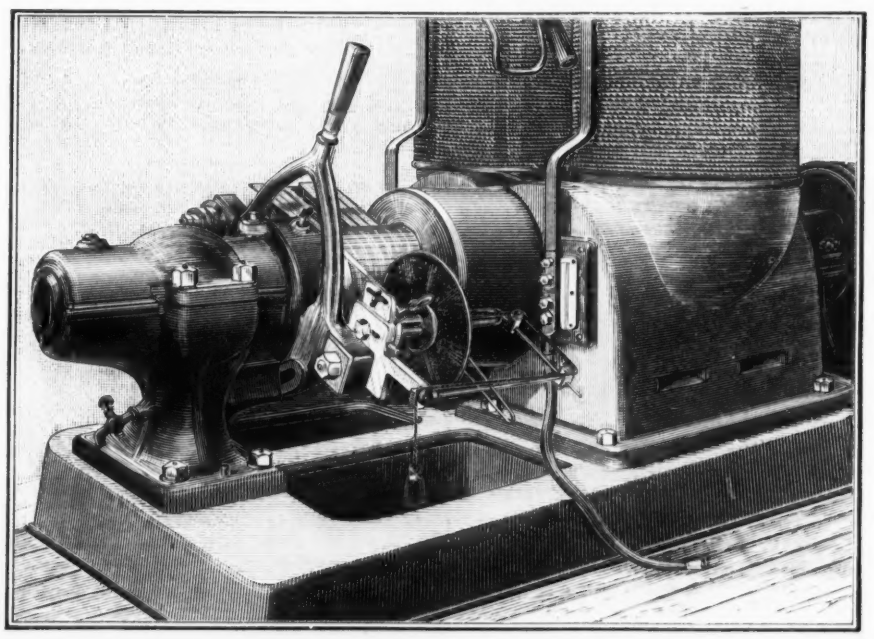
Commutator Dressing Machine.

We illustrate herewith a machine which is designed to true the commutators of dynamos by grinding while they are in place, and running at ordinary speed. The machine works automatically, can do no damage, and there is no danger of short circuiting.

The machine consists of a plate *B*, having both faces finished, this plate attaching to the dynamo at right angles to the axis of armature in the manner shown by the larger engraving, which shows it attached to an Edison dynamo, the brush holder being removed for that purpose. A stud fits into a slot in this plate, and carries a sleeve which revolves freely on the stud, and is driven by a small round belt which passes over a pulley at the inner end of the stud, and over the iron collar at the end of the commutator. This sleeve is splined, and sliding upon it is a shorter sleeve which carries the emery or other grinding wheel, this sleeve being driven by means of studs which engage with the spline, and which carry anti-friction rollers, the traverse of this collar being effected by means of the wire handle shown, or by means of the cord and weight, if desired. The idler shown takes up the slack in the driving belt.

The makers, Cummings & Brandon, 1,441 Broadway, New York City, will at short notice dress dynamos in the city, or will supply the machine for others to use.





COMMUTATOR DRESSING MACHINE.

In our issue of November 19, Mr. Peter H. Bullock asks for a pipe cutter that will cut pipe square off without burring. Replying to this communication, D. Saunders' Sons, of Yonkers, N. Y., write that their pipe cutter will accomplish all that our correspondent asks for, leaving, to quote, "the end of the pipe perfectly square and true, entirely void of any burring inside or outside."

The high steam pressure used in modern multiple-cylinder engines has occasionally caused the bursting of copper steam pipes. These accidents have led to the inquiry for a stronger and suitable material for the purpose, and lap welded steam pipes have been suggested and used in comparatively small boats. According to the *Engineering*, of London, Mr. Andrew Laing, the engineering director of the Fairfield Shipbuilding and Engineering Company, has devoted much attention to the question lately, and decided to adopt lap-welded steam pipes in the new Isle of Man steamer Tynwald, and also in the Welsh paddle steamer St. Tudno; a few tests satisfied him of the reliability of lap-welded pipes. A pipe 11¼ inches internal diameter, with metal $\frac{13}{32}$ of an inch thick, was subjected to a hydrostatic test; it burst with a loud report, under a gauge pressure of 3,100 pounds, and split at edge of weld from flange to flange, which were screwed onto the ends for the purpose of making the test. A pipe 8 inches internal diameter, with metal $\frac{5}{16}$ of an inch thick, burst with a sharp report, under a gauge pressure of 2,800 pounds. Pieces were cut from ordinary stock pipes and prepared for testing. The pieces were broken both when hot and cold, and the results show that there was really no difference in the strength between hot and cold pipes. The difference between the solid plate and the weld was found to be very small. These tests were made with an ordinary testing machine.

Machinists' Supplies and Iron.

NEW YORK, November 21, 1891.

Iron—American Pig—More activity is reported, but prices are not maintained.

We quote Standard Northern brands, No. 1 Foundry, at $16 to $17; No. 2 is selling at $15 to $16.50, and Grey Forge at $13.75 to $14.50. Southern brands of good quality are obtainable at $16 to $17.50 for No. 1 Foundry; $15.50 to $16 for No. 2; and $14.25 to $14.50 for No. 3.

Scotch Pig—We quote Coltness at $23, and Eglington at $20.50.

Antimony—The advance has made further progress, due principally to the scarcity of the metal, and of the higher prices asked by the English smelters.

We quote Hallett's at 12¼c. to 12¾c.; Cookson's at 16¾c. to 16½c.; and L X at 15¼c. to 15½c.

Copper—The market remains flat, and buyers are postponing purchases. Lake Copper for present delivery can be bought at 11¼c., but futures are obtainable at 11⅛c. Casting Copper remains very scarce, and is not obtainable below 10¾c. to 11c.

Lead—A radical change has been made in the views of the smelters. They are now indifferent, and some of them decline to quote any figures. A few lots have been picked up at 4.10c. to 4.15c., and 4.20c. is now bid for important quantities, but 4.35c. seems to be lowest figure demanded. However, there is little confidence in the stability of the values.

Lard Oil—The market is steady at 53c. to 54c. for Prime City, according to holder and quantity. Western on spot is quoted at 52c.

Spelter—There are still offerings to arrive at 4.90c. to 4.95c. by the carload, with bids at 4.80c., which have not yet been accepted.

Tin—The market fluctuations have been important and speculative interest is very quiet; the best bid is 19.90c.

✲WANTED✲

"Situation and Help" Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Pattern maker exp'd in general pattern making, special mach'y, etc., desires sit. Box 99, AM. MACH.

Foreman of machine shop desires change of position. A1 references. Change, AMERICAN MACHINIST.

A designer and draftsman, with technical education and shop experience, and has handled men, wants a position. Ohio, AMERICAN MACHINIST.

Wanted—A competent brass molder to act as foreman; must thoroughly understand mixing metals. Sullivan & Ehlers, Albany, N. Y.

A first-class draftsman on general work desires a change. Has had good shop experience. Address Energy, care AMERICAN MACHINIST.

First-class mech. draftsman desires situation. College grad.; shop prac.; thorough in general machinery. Best refs. Box 6, AMERICAN MACHINIST.

Wanted—Position as foundry foreman; 20 years' experience in Corliss engine and general jobbing work. Address Business, AMERICAN MACHINIST.

Wanted—A situation as foreman of a machine shop; can turn out first-class work at lowest possible cost. W. H. M., AMERICAN MACHINIST.

An experienced and skillful mechanical engineer desires permanent engagement. First class reference. Address Box 100, AMERICAN MACHINIST.

Mech. draftsman wanted for several months at chem. works near N.Y. Must be comp't and industrious. Salary, $21 weekly. Address, stating age, experience and reference, Box 230, Bayonne, N. J.

Position desired as superintendent, by a thoroughbred, driving man, accustomed to take entire charge of shop. Well up in modern machine and foundry work, with long experience in getting up whole plant for making high-class, interchangeable work. Address Box 3, AMERICAN MACHINIST.

Wanted—Brass foundry foreman, one thoroughly familiar with the mixing of metals, bronzes, etc.; also core making, and able to manage and control men. Good chance for a comp't man in one of the leading concerns mfg. steam work. Address Brass Works, AMERICAN MACHINIST.

Wanted—Brass molder capable of taking charge of a brass foundry for a large mfg. establishment in Ohio. Must understand thoroughly the molding and mixing of metals, and producing castings quickly and cheaply. A steady position to the right man. Address G. P., care AMERICAN MACHINIST.

✢ MISCELLANEOUS WANTS ✢

Advertisements will be inserted under this head at 35 cents per line, each insertion. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue. Answers addressed to our care will be forwarded.

Cheap 2d hd-lathes & planers. S. M. York, Clev'd, O.

Auto. Steam Flue Cleaners. Kelley Co., Erie, Pa.

Light and fine machinery to order; Foot Lathe Catalogue for stamp. E. O. Chase, Newark, N. J.

Best Bolt Header in the world for $50. Address C. H. Baush & Sons, Holyoke, Mass.

Wanted—Specialties to build for the Southern trade. Bluefield Iron Works, Bluefield, W. Va.

Corliss engs. and gen. mach'y designed, working drawings made. A. W. Jacobi, 136 Liberty St., N. Y.

Wanted—A modern Corliss engine, about 175 H. P. Must be in good order. Chicago Forge & Bolt Co., 40th Street and Stewart Ave., Chicago.

Special leather and cement for covering pulleys; no rivets required; local agents wanted. Crescent Mfg. Company, Cleveland, Ohio.

To manufacture light special and automatic machinery, novelties, models, patterns, tools, etc., by Orange Machine and Repair Works, Orange, N. J.

Complete castings for model dynamo with working drawings, $2.50. Circular and photograph for stamp. A. J. Weed & Co., 106 Liberty St., N. Y.

Wanted—A1 machinist or pattern maker, to take an interest in my machine shop, to manufacture small engines. 2615 & 2617 Strand, Galveston, Texas.

Wanted—Gear Planer—Gleason preferred; second-hand or new. Also a Corliss Engine, 12″x30″ or 10″ x36″ for cash, 36″ to 42″ planers 12′ or longer. Address Box 1, care of AMERICAN MACHINIST.

Special machinery designed and built. C. F. Langston & Co., 70 N. 4th St., Philadelphia.

Wanted—Engineers to write for catalogue of all the latest and most valuable mechanical, scientific and electrical books which are given free with each barrel of the Pittsburgh Boiler Scale Resolvent. Pittsburgh Boiler Scale Resolvent Co., Pittsb'gh, Pa.

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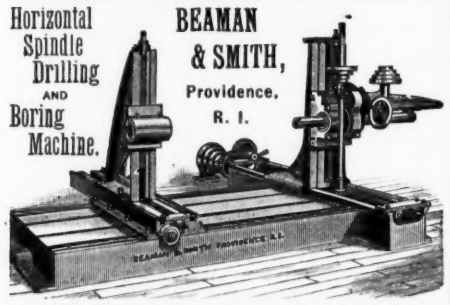
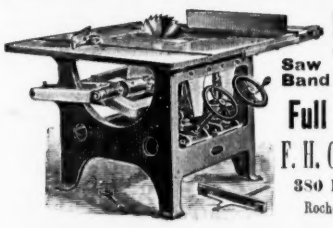


PATTERN SHOP MACHINERY.



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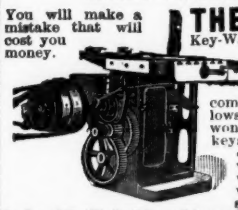
You will make a mistake that will cost you money.



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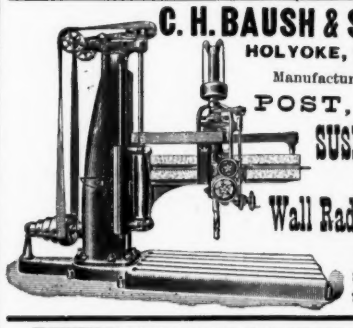

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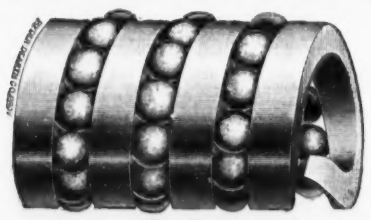

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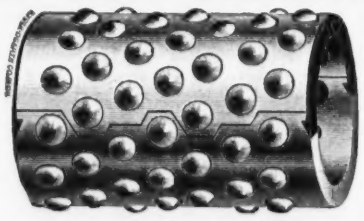

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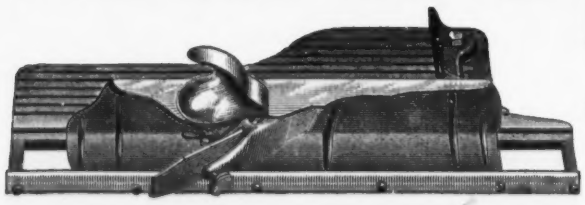

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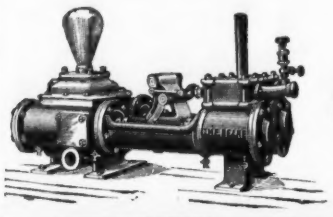

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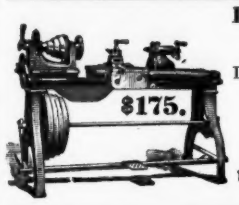

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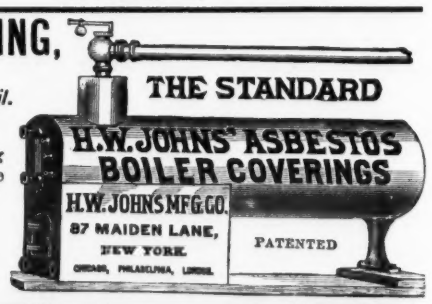

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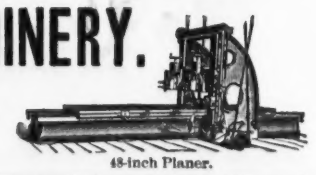
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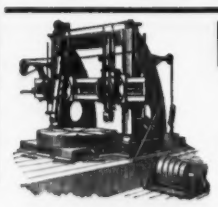

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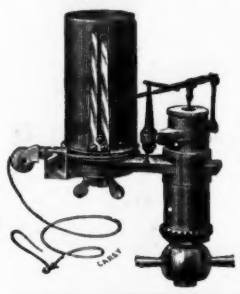

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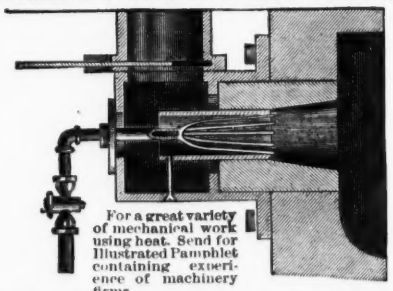

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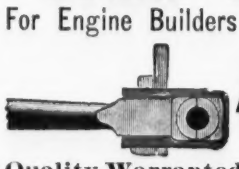

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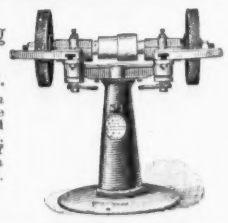

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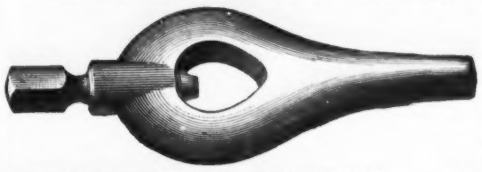

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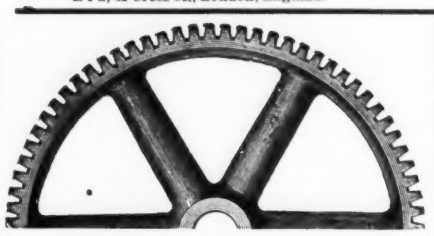

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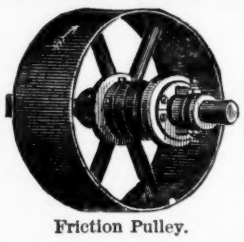

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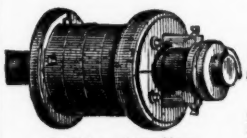

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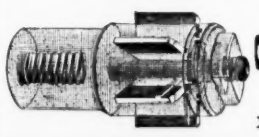

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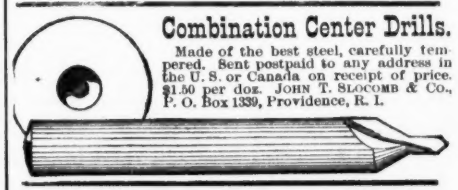

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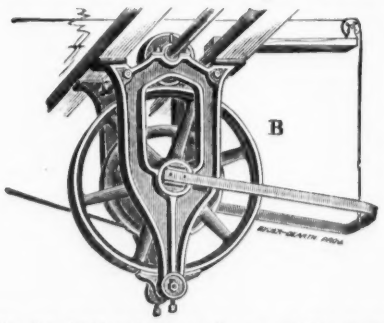

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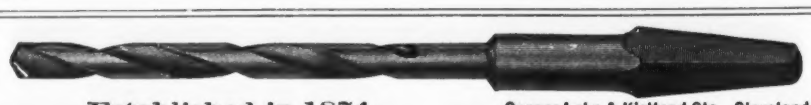

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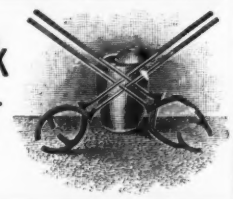

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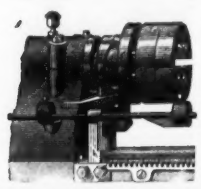

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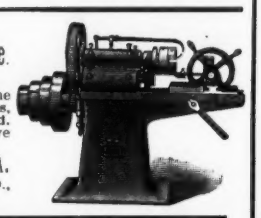

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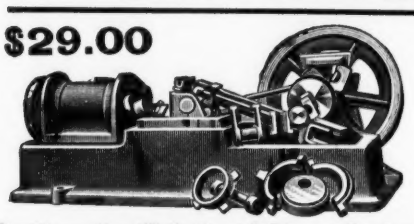

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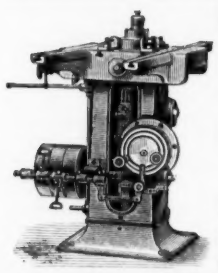

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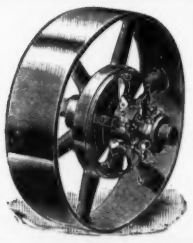

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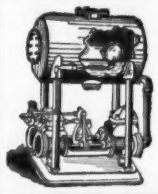

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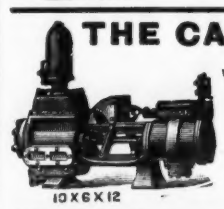

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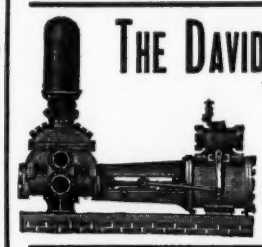

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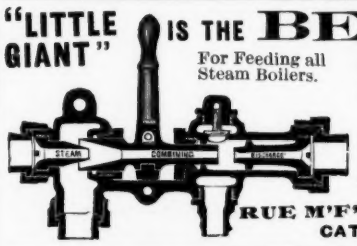

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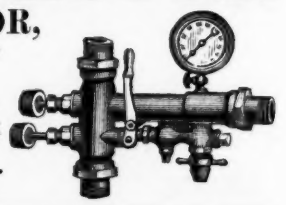

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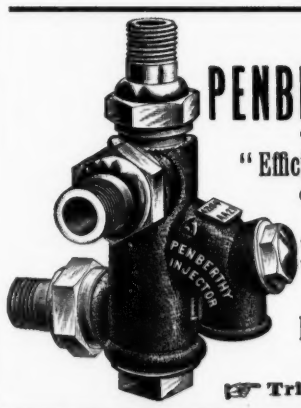

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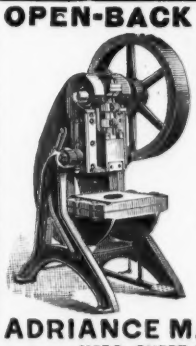

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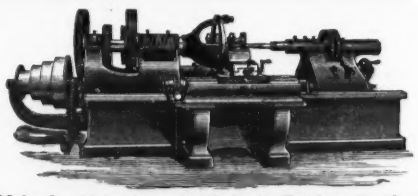

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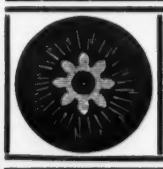

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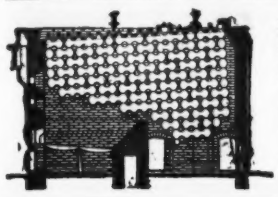

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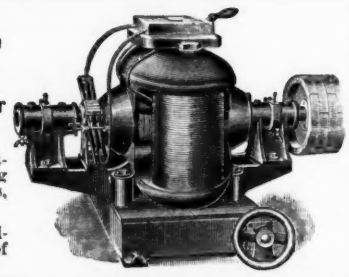

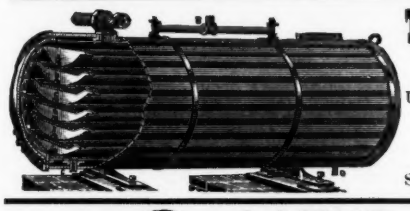

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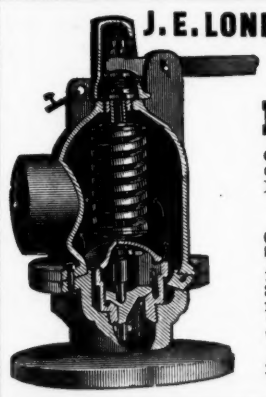

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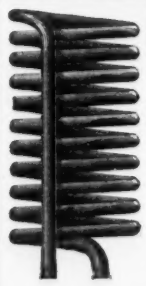

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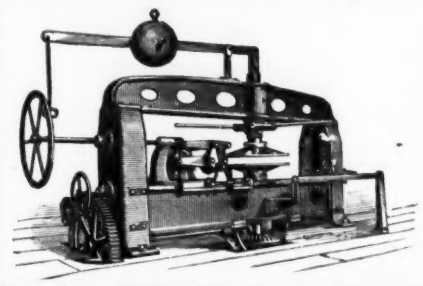

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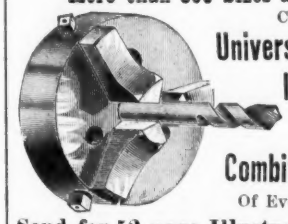

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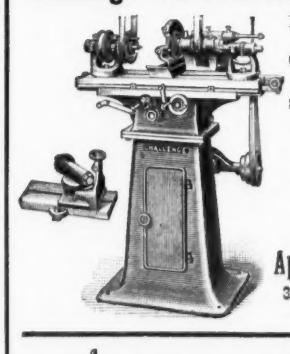

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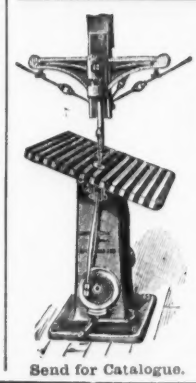

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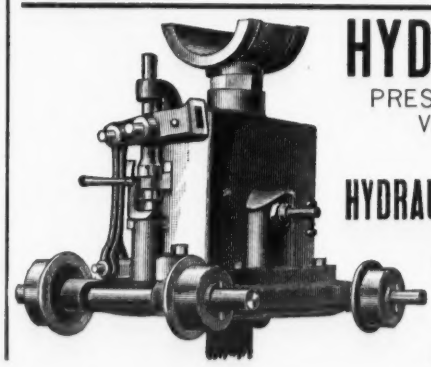

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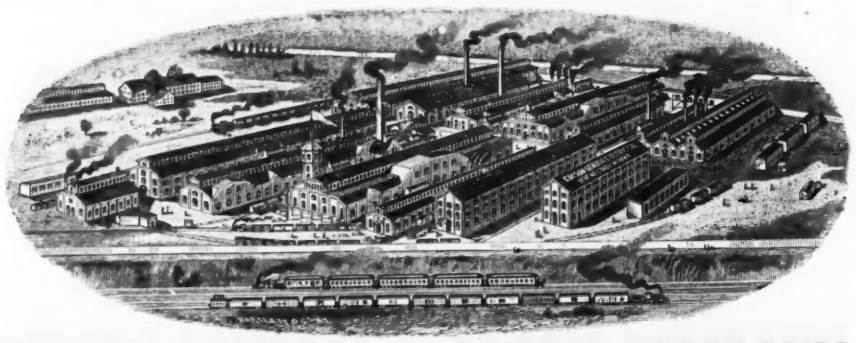

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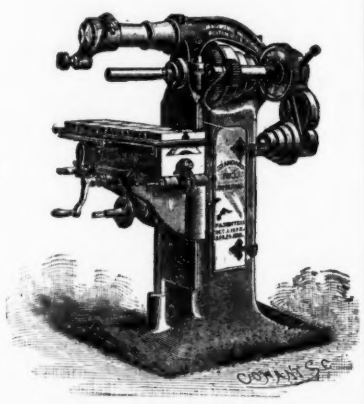

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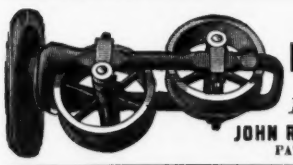

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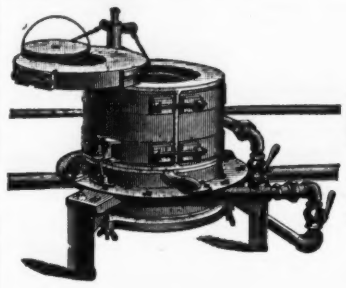

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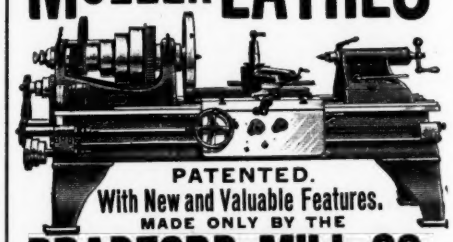

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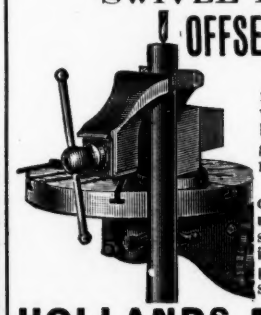

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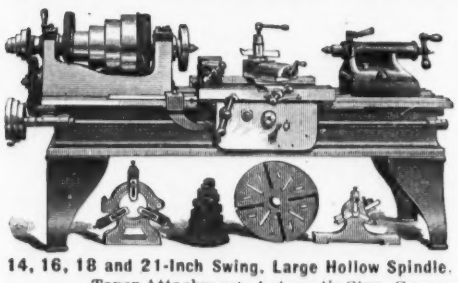

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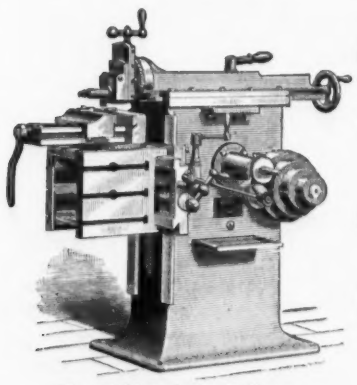

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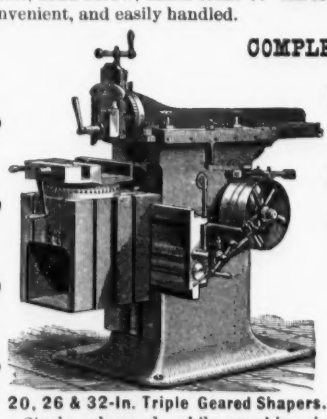

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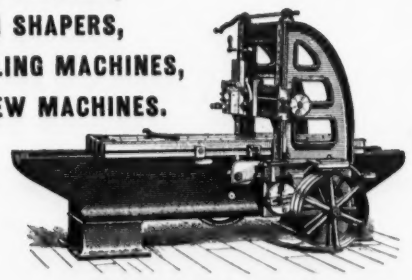

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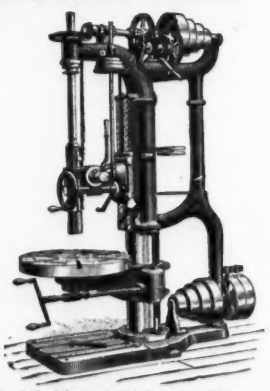

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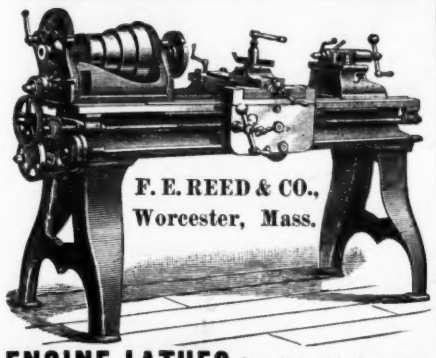

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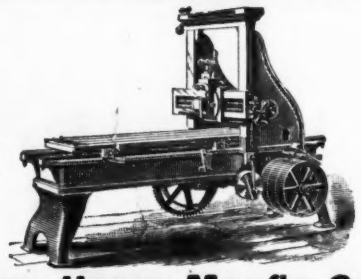

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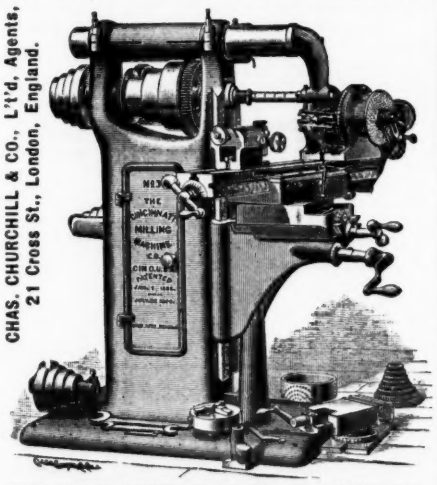

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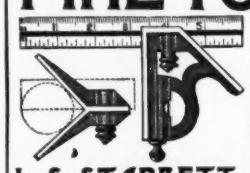

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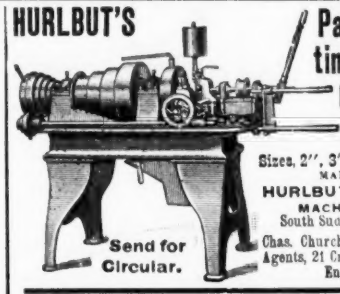

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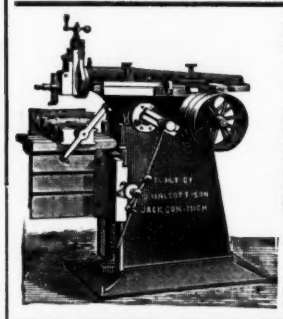

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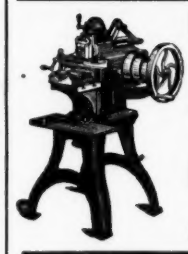

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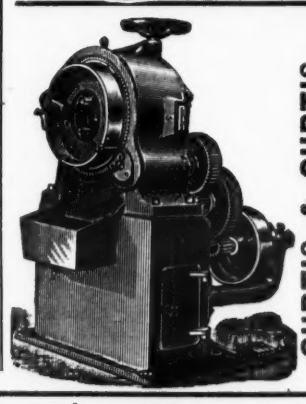

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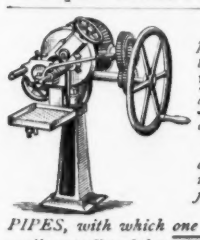

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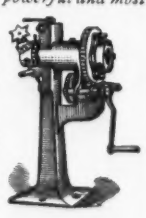

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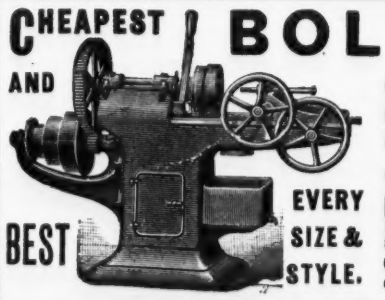

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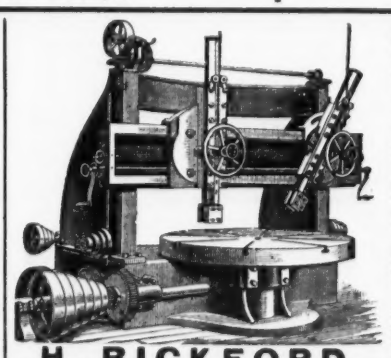

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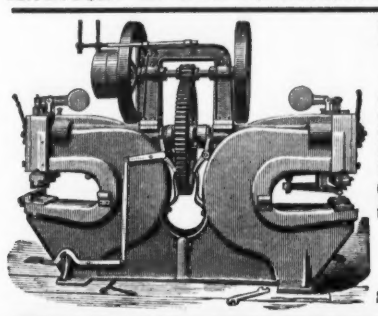

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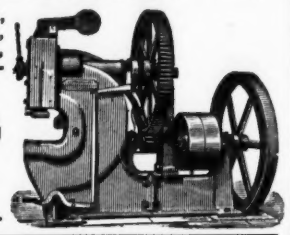

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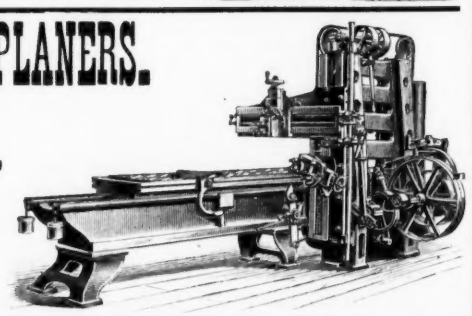

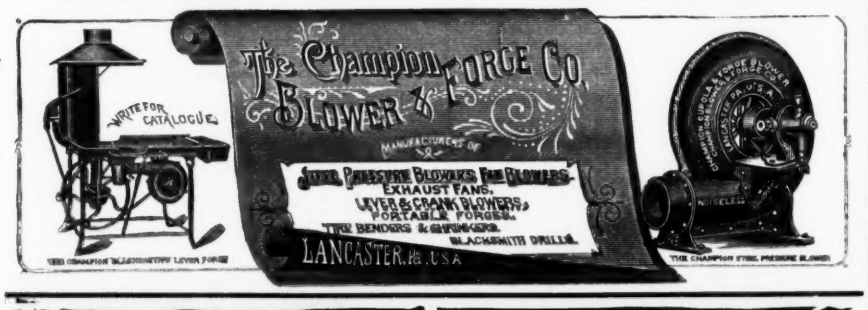

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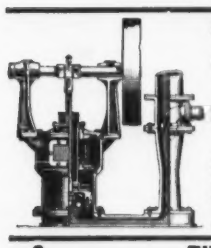

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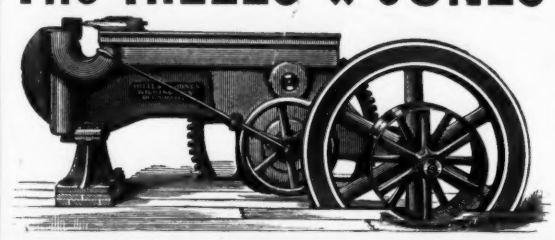

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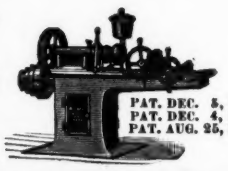

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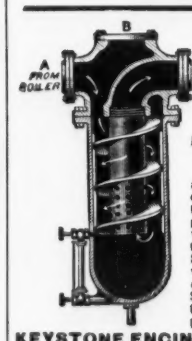

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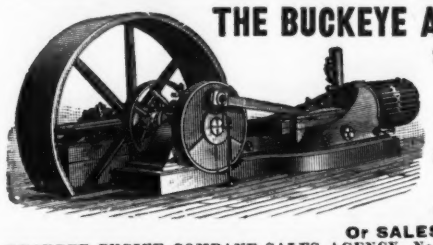

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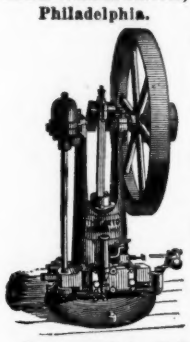

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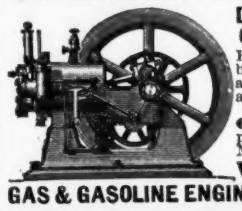

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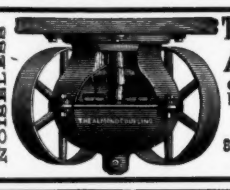

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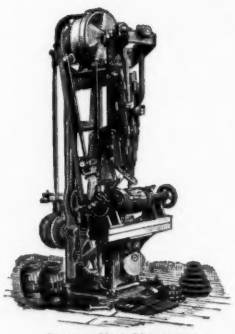

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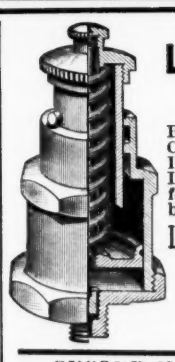

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1 Planer, 24 in. do 6 ft. do	do do
1 Planer, 24 in. do 6 ft. do	do do
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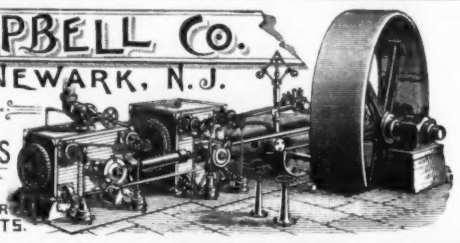

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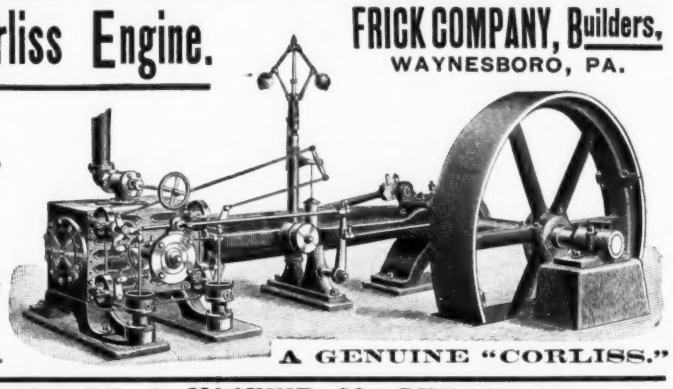

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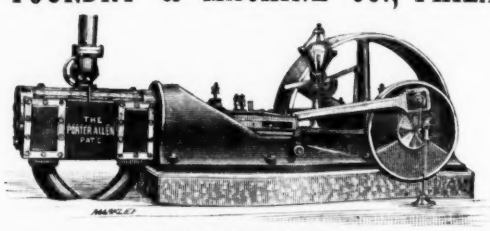

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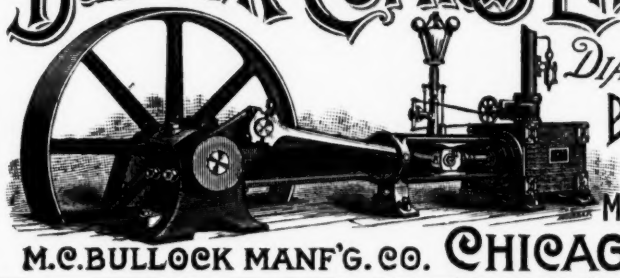

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"	"	25 in.	"	12 ft.	bed, New Haven, good order
"	"	24 in.	"	12 ft.	bed, Fitchburg.
"	"	24 in.	"	12-14 ft.	bed, Standard pattern.
"	"	24 in.	"	12-24 ft.	bed, Perkins.
"	"	20 in.	"	8-10-13 ft.	beds, Standard pattern
"	"	18 in.	"	8 ft.	bed, Fitchburg.
"	"	18 in.	"	8 ft.	bed, Standard pattern.
"	"	18 in.	"	6-10-10 ft.	beds, Hendey.
"	"	16 in.	"	6-8 ft.	beds, Fitchburg.
"	"	14 in.	"	6 ft.	bed, Hendey, Taper attach
"	"	14 in.	"	6 ft.	bed, Fitchburg, " "
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"	"	12 in.	"	6 ft.	bed, Prentice.

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do 30	do	30	do	x8-10 ft.	"
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do 24	do	24	do	x6 ft.	Fitchburg.
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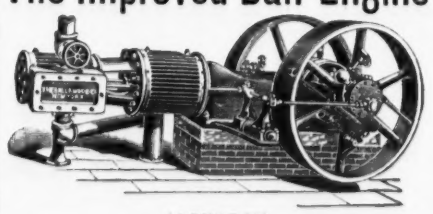

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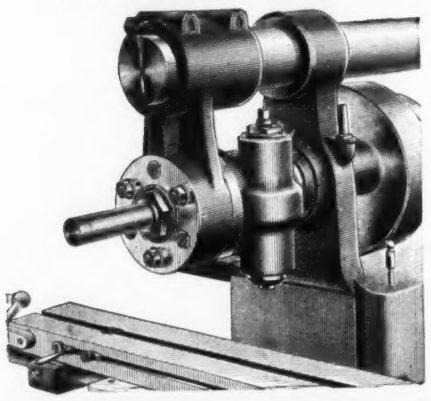

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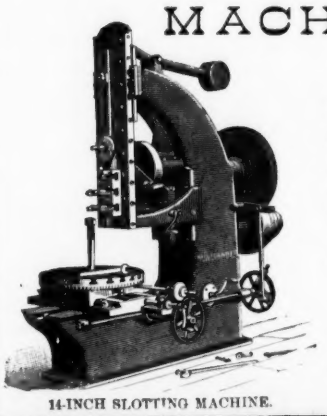

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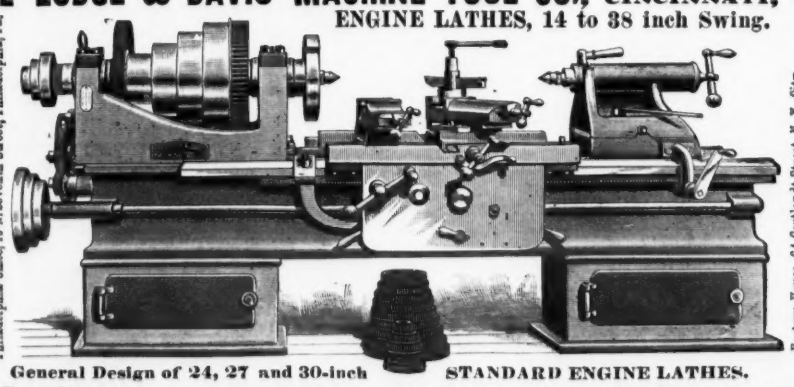

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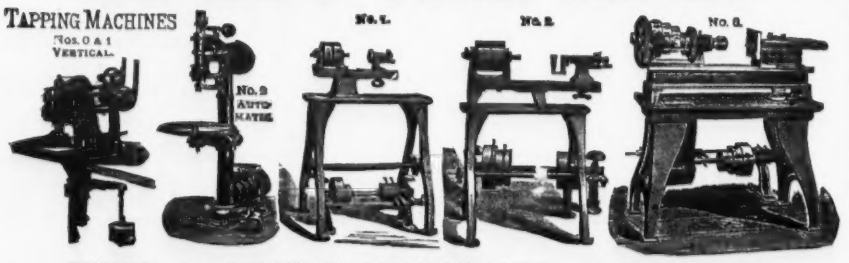

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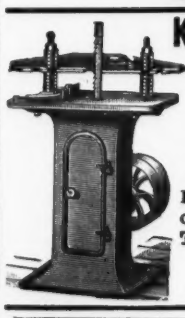

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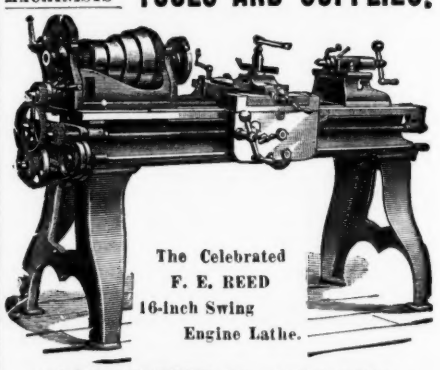

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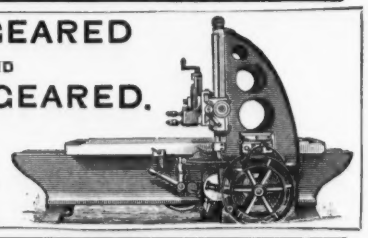

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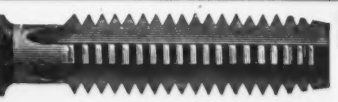

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